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ggtgatactctcacaatcagaagttcaaggcgaagccacactgactgtagacaaatctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctcgggtctattctgtgcaagagtggtgactatagtaactcttactgactctgactgtcgggcac
aggcgaccacggtcaccgtctctctgtatcaatccaactctgaagaagcaagaagagagccaaaaaggaggaagcaaga
aatctaacacgctgcacattgttctgactcagctccagccaccctgtctgtgactccagagatagagctctcttctcgcaggcc
5 agccagagatlagcgactacttactcgtgtatcaacaaaaatcacatgagctccaaggcttctacaaatagcttccatccatc
tctggatcccccaggttcagtgaggcagtgatcagggtcagattcactctcagatcaacagtggtggaacctgaagatgttgaa
tttactgtcaacatgggtcacagctllccgtggaggttcgggtggagggcaccaagctggaatacaaacgggtggcgggtcgtc
ggcggaggtgggtcgggtggcgggagctcagatccagttgggtgcaactggaccctgagctgaagaagcctggagagacag
caggatctcctcgaaggcttctgggtatgcctcaactactggaatgcagtggtgcaagagatgccaggaaagggtttgaagt
10 ggtatggctggataaacaccccactctggaagtgcacaaatgtagaagactcaaggacggtttgctctcttggaaacctctgc
caacactgcataattacagataagaacctcaagatgaggacacggctacgtatttctgtgtgagatcggggaatgtaactatga
cctggcctacttcttactgggccaagggaactggtcactgtctctgatacggagcccaaatctctgacaaaactcacacatc
ccaccgtcccagcactgnaactcctgggggagctgtcagctctctctctcccccacaaacccaagacacccctcatgactcccg
gaccctgaggtcacatcgctgtggtggagctgagccacgaagacctgagtgcaagttcaactgtacgtggagcgcgtgga
15 ggtgcataatgccaagacaaagccgctggagggcagctacacagcacgtacgtgtgtgtagcagctcctcaccgtctgacca
ggctgctgctgaatggcaagggtacaaaggtcgaaggtctcacaacaaagccctccagccccatcgagaaacaaatccaaagc
caaaaggcagccccgagaaaccagagtgacaccctgccccatcccggaatgagctgaccaagaaccaggtcagcctgact
gctgtgcaaaaggcttctatccagcgacatcgcctggagtgaggagcaatggcgagccggagaacaactacaagaccacg
cctccgtgctgactccgacggctcctctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgctct
20 tctatgctccgtgatgcatgaggtctgcacaaactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

2H7-antiCD40 scFv MTH (SSS) MTCH2W1CH3 (2H7-40.2.2201g) (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSLILISASVIIARGQIVLSQSPAILASPGKEKVTMTCRASSSVSYMHWY
25 QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKGSGSGSGSGSGSGSQAYLQSQGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYSNSYWFYFDVWGTGTTVTVSSDQSNSEAK
KEEAKKEEAKKSNSVDIVLTQSPATLSVTPGDRVLSLSCRASQSISDYLHWYQQKSH
30 ESPRLLIKAYASHSISGIPSRFSGSGSGSDFTLSINSVEPEDVGIYYCQHGHSPWTFGG
GTKLEIKRGGGSGGGSGGGSGGSIQLVQSGPELKKPGETVRISCKASGYAFTTTG
MQWVQEMPQKGLKWIGWINTPLWSAKICRRLRQGRFAFSLETSANTAYLQISNLKD

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EDTATYFCVRSNGNGNYDLAYFAYWGQGLVTVSDQEPKSSDKTHTSPSPAPPELL
GGSSVFLFPKPKDMLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPRE
PQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSD
5 GSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

5B9 VH (includes the VH leader peptide) (nucleotide sequence) (SEQ ID NO: __)

atggctgctctgggggctgctctctgctcgggtgacattccaagctgtgtcctatccagggtgcagctgaagcagtcaggacgtggcc
tagtgcagctctcacagagcctgctccalcactgcacagctctgtgttctcattaaactacctatgctgtacactgggttcgccagctctc
10 caggaaagggtctggagctgggtggagtgatgagtggtggaatcacagactataatgcagcttcatatccagactgagcatc
accaaggacgattccaagagccaagtttctttaaataaacaagctgtgcaacctaatgacacagccatttattactgtgccagaaatg
ggggtgataactacccttattactatgctatggactactgggggtcaaggaaactcagtcaccgtctccica

5B9 VH (minus the leader) (nucleotide sequence) (SEQ ID NO: __)

15 caggtgcagctgaagcagtcaggacclggcctagtgcagctccacagagcctgtccaicacagctctctgttctcatta
actacctatgctgtacactgggttcgccagctccaggaaagggtctggagtggtctgggagtgatagggagtggtggaatcacaga
ctataatgcagcttcatatccagactgagcatcaccaaggacgattccaagagccaagtttctttaaataaacaagctgtgcaacctta
atgacacagccatttattactgtgccagaaatgggggtgataactacccttattactatgctatggactactgggggtcaaggaaactca
gtcaccgtctccica

20

5B9 VH (includes leader peptide) (amino acid sequence) (SEQ ID NO: __)

MAVLGLLFLCLVTFPSCVLSQVQLKQSGPGLVQSSQSLSITCTVSGFSLTTYAVHWV
RQSPGKGLEWLGVISGGITDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDAIY
YCARNGGDNPYPYYAMDYWGQGSVTVSS

25

5B9 VH (no leader peptide) (amino acid sequence) (SEQ ID NO: __)

QVQLKQSGPGLVQSSQSLSITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVISGGI
TDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDAIYYCARNGGDNPYPYYAMDY
WGQGSVTVSS

30

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5B9 VL (nucleotide sequence) (SEQ ID NO: __)

atgagggtctctgtcagcttctggggctgtgtgctctggatccctggatccactgcagatattgtgatgacgcagggtgcattctc
caatccagtcactcttggaaacatcagcttcacatctctgcagggtctagttaaggagtctctacatagtaatggcatcacttaattgtattgg
taatctcgagaagccagccagctctctcagctctgatttatcagatgtccaacctggcctcaggagtcaccagacaggttcagtagca
5 ggggtcaggaaactgatttcacactgagaatcagcagagtggaggctgaggatgtgggtgtttattactgtgtctcaaaatcagaact
tccgtctcagcttgggtctgggaccgaagctggagctgaaacgg

5B9 VL (amino acid sequence) (SEQ ID NO: __)

MRFSAQLLGLLVLPWPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLSHNGITY
10 LYWYLQKPGQSPQLLIYQMSNLAGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKR

5B9 scFv (nucleotide sequence) (SEQ ID NO: __)

aagcttggccgcattgagggtctctgtcagcttctggggctgtgtgtctgtggatccctggatccactgcagatattgtgatgacgca
15 ggctgcattctccaatccagtcactcttggaaacatcagcttcacatctctgcagggtctagttaaggagtctctacatagtaatggcatca
cttatttgtattgtatctgcagaagccaggccagctctctcagctcctgatttatcagatgtccaacctggcctcaggagtcaccagaca
ggttcagtagcagtggttcaggaaactgatttcacactgagaatcagcagatggagggtgagatgtgggtgtttattactgtgtc
aaaatcagaactccgctcagcttgcgtgtgggaccgaagctggagctgaaacgggggtgagggtgctcgggcggltgtgggt
cgggtgctggcgggacgtgcacaggtgcagctgaagcagtcaggacctggcctagtgcagtcctcacagagcctgtccatcacct
20 gcacaggtctctgtttctcttaactacatctgctgtacactgggttcgccagtcctcaggaaaaggcttcggagtggtctggagatgat
atggaagtgtgggaatcacagactataatgcagctttcatalccagactgagcatcaccgaagacgatccaagaaccaagtttcttt
aaaatgaacagctctgcaacctaatgacacagccatttattactgtgccagaatgggggtgataacctacctattactatgctatgga
ctactggggtcaggaaacctcagtcaccgtctctct

5B9 scFv (amino acid sequence) (SEQ ID NO: __)

MRFSAQLLGLLVLPWPGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLSHNGITY
LYWYLQKPGQSPQLLIYQMSNLAGVDPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGSGGGSGGGSSQVQLKQSGPLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLVGVWSGGITDYNAAFISRLSITKDDSK
30 SQVFFKMNSLPNDTAIYYCARNGGDNPYYYAMDYWGQGTSTVTVSS

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ENNYKTTPVLSDSGSFFLYSKLTVDKSRWQQGNVFSVMEALHNHYQKSL
LSPGKADPSNLLPSWAITLISVNGIFVICCLTYCFAPRCRERRRNERLRRESVRPV

2e12 scFv WTH CH2 CH3 (2e12 scFv-WthIgG-CD80) (nucleotide sequence) (SEQ

5 ID NO:)

aaagctatggatttcaagtcgacatttcagcttctgctaatacagtcctcagtcataatgtccagagagagtcacattgtctcacc
aatctccagcttcttggctgtctctaggtcagagagccacatctctgcagagccagtggaagtgtgtaataatgatgcacaagtt
taatgcagtcggtaccacagaacacagagacacccaaactctcatctctgctcatccaagtagaattcgggtccctgcc
agggttagtgagcagtcggtctgggacagactcagcctcaacatccatctgtggaggagatgataatgcaattttctgtcagc
10 aaagtaggaaggttcttggacgttcgggtggagcccaagctggaaatcaaacgggtggcgtgctggcgggaggtggg
tcgggtggcggcggtatcaggtgcagctgaaggagtcagacctggcctgggtggcgcctcacagagcctgtccatcacatgc
accgtctcagggttctcattaaacgggtatgtgttaactgggttcgccgcctccaggaaagggtctggagtgctgggaatgat
atgggggtgatggaagcacagactataatcagctctcaaatccagactgagcatcaccaaggacaactccaaggaccaagtttctt
aaaaatgaacagctgcgaactgatgacacagccagataactgtgccagagatggttatagtaacttcatctactgttatggact
15 actgggttcaggaaacctcagtcaccgtctctcagatctggagcccaaatctgtgacaaactcacatgcaccaccgtgccca
gcacgtgaactcctggggggaccgtcagctctctctcccccacaaacccaaggacacccctcagatctccgggacccctgaggt
cacatgcgtggtggtggagcgtgagccacgaagacctgaggtcaagtcaactgtgtacgtggagcggcgtggaggtgcataatgc
caagacaaagccggggagggagcagtacaacagcacgtaccgtgtgtcagcgtctcaccgtcctgcaccaggaactgggtga
atggcaaggaggtacaagtgcagggtctccaacaaagccctccagcccccacgcagaaaaacatctccaaggccaagggcag
20 cccgagaaccacaggtgtacacctgcccccacccgggatgagctgaccaaagaaccaggtcagcctgacctgctctgggtcaaa
ggctcttatccagcgcacatgcgcgtggagtgaggagagcaatgggcagccggagaaacactacaagaccacgcctccctgtct
ggactccgacggcctctctctctacagcaagctcaccgtgacaaagacaggtggcagcagggggaactcttctcatgtctc
gtgatgcagtgagctctgcacaacactacacgcagaagacccctcctcctcctccggtaangcggatccttgcgaactgtctcc
atcctggggcattacattaatcagtaaatggaatttctgtatagctgcctgacctactgcttgcgcccaagatgcagagagagaa
25 ggaggaatgagagattgagaagggaaggtgacgccctgtataatcgat

2e12 scFv WTH CH2 CH3 (2e12 scFv-WthIgG-CD80) (amino acid sequence) (SEQ

30 ID NO:)

MDFQVQIFSLLISASVIMSRGVDIVLTQSPASLAVSLGQRATISCRASESVEYYVTS
LMQWYQKPGQPPKLLISAASNVESGVPARFSGSGSTDFSLNIHPVEEDDIAMFY
CQQSRKVPWTFGGGKLEIKRGGGGSGGGSGGGGSGVQLKESGPGVLVAPSQSL
ITCTVSGFSLTGYGVNWNVRQPPGKGLEWLGMTWGDGSTDYNSALKSRLSITKDNS

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KSQVFLKMNSLQTTDARYYCARDGYSNFHYVMDYWGQGSVTVSSDLEPKS
CDKTHTCPPCPAPELLGGPSVFLPPKPKDITLMISRTEVTCVVVDVSHEDPEVKFN
WYVDGVEVHNAKTKPREBQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALP
APIEKTISKAKGQPREPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQ
5 PENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNYHTQKSL
SLSPGKADPSNLLPSWAITLISVNGIFVICLTYCFAPRCRERRRNERLRRESVRPV

2H7-human IgE Fc (CH2-CH3-CH4) (nucleotide sequence) (SEQ ID NO: __)

aagcttgcgcgcatttgcaatgcagatttcagcttctcgtcaatcagtgcttcagtcataattgccagaggacaaattgtctct
10 cccagctccagcaatcctgtctcgtcctccaggaggagaaagtcacaaagacttcagagggccagctcaagtgtaagtacatgcact
ggtaccagcagaagccaggaatcctccccaacccctggattatgcccatcacaacctggtctctggagtcctctgctcgttcagtg
cagctgggtctgggacccttactctctcacaacagcagagtgagggtgaagatgctgcacattactgcccagcagtggaattt
taaccacccacgttcgtctgggaccgaagctggagctgaaaggtggcgtgctcggcggtggtggtgagctcggagagggtg
ggagctccagcgttatcagcagctcggggtgagctggtgagggcctgggctcagtgaaagatgctcctcaagggcttctggtc
15 tacacatttacagttacaatatgcaactgggttaaagcagacacctagacaggccctggaatggagtggagctattatccaggaaat
ggtgatacttccatcaatcagaagttcaaggcgaaggccacactgactgtagcaaatcctccagcacagcctacatgcagctcag
cagcctgacactgaagactctgggtctatttctgtgcaagagtggtgtactatagtaacitctactggtactcgtatgtctggggcac
agggaccacgggtaccgtctctgaltcagctgtcctccagggaactcaccggccacagtggaagattctacagctgtcctgcgacg
gctggcggtcacttccccgaccatccagctcctgtgctcgtctcgttggtacacccagggaactatcaacatcactgggtgga
20 ggacgggcaaggtcatggagctggaactgtccaccgctctaccacgcaggagggtgagtgcgctccacacaaagcgagctca
ccctcagccagaagcactgggtgtcagaccgacactacacctgccaggtcactatcaaggtcacacottgagacagaccacaa
gaagtggtcagattccaaccgagaggggtgagcgctacctaaggccggccagccggttcgactgttcatccgaagtgcgc
cacgatacctgtctgggtgtgacctggcaccagcaaggggacctgaacctgacctgtccggcgacgtgggaagcctgt
gaaccactccacagaaaggagagaaagcagcgaatggcaggttaacctgacgtccacctgcccgtgggcacccgagact
25 ggaatcagggggagacctaccagtcagggtgaccacccccacctgccagggccctatgctgtccagacccaagaccag
cgcccgccgtgtcgtcccggaagtctatgctttgcgacgcccagtggtccggggagccggggagccggagacaagcgcacctcgtcgtc
ctgatccagaactcatgcttgaggacatctcgggtcagtggtgcacaacgaggtgcagctcccggagcggccgacagcagc
acgacgccccgcaagaccagggtccggctctcgtctcagccgctggaggtgaccaggccgaalggggcagcaagaaga
tgagtatctgctgctgagctccatgagcagcggagccctcacagacctccagcagcgggtgtctgtaaatccggtaantgat
30 aatcaga

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2H7 scFv IgE (CH2-CH3-CH4) (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSLFLISAVIIARGQIVLSQSPAILSASPGBKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 FNPPTFGAGTKLELKGSGSGSGSGSGSSQAYLQSGAELVRPGASVKMSCK
 5 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
 TAYMQLSSLTSEDASVYFCARVYVYSNSYWFYDVGWGTGTTVTVDHVCSDRFTF
 PTVKILQSSCDGGGHPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTASTQE
 GELASTQSELTLQKHWSLDRYTCQVTYQGHTFEDSTKKCADSNPRGVSAYLSR
 PSPFDLIRKSPITITCLVVDLAPSKGTVNLWTSRASGKPVNHSTRKEEKQRNGTLTV
 10 TSTLPVGTDRWDIEGETYQCRVTHPLPRALMRSTTKTSGPRAAPEVYAFATPEWP
 GSRDKRTLACLQNFMPEISVQWLINEVQLPDARHSTTQPRKTKGSGFFVFSRLE
 VTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

2H7 scFv MH (SSS) MCH2W2CH3 (nucleotide sequence) (SEQ ID NO: __)

15 aagcttgceggcgaatttcaagtcgagatttcagcttctgctaactcagtgcttcagtcataahtgcagaggacaattgtctct
 ccagctctccagcaatctctgtctgcatctccaggaggagaagctcaaatgacttcagggccagctcaagtgtaagtacatgcact
 ggtaccagcagaagccagatctctccccaaacctggatttatgcccatccaaactgctctggagctccctgtctgcttcagtg
 gcagtggcttgaggacctcttactctctcacaatcagcagagtgaggctgaagatgctgccacttattactccagcagtggaattt
 taaccaccaccagcttcggtgctggaccagctggagctgaagatgctggctgctcggcggtgctggatctggaggagagtg
 20 ggagctctcaggtctatctacagcagctctggggtgagctggtagggcctgggacctcagtggaagatgctctcgaaggctctggc
 tacacatttaccagttacaatatgcactgggtaaagcagacacctagacaggcctggaatgattggagctattatccagaaat
 ggtgatactctcacaatcagaagttcaaggcgaagccacactgactgtagacaaatctccagcacagctcatcagcagctcag
 cagcctgacatctgaagactctcgtgctcttctgtcgaagagtggtgtactatagtaactcttactggtactctgatgtctgggcac
 agggaccacggtcaccgtctctctgatcaggagcccaatctctgacaaaactcacacatccccaccgtccccgacctgaac
 25 tctgggggatgtcagctcttctcttcccccaaaacccaaggacacctcatgatctccggacccctgaggtcacatgcgtg
 gtggtgagctgagccacgaagaccttgaagtcaggtaactggtacgtggagcgctggagggtgataatgccaaagacaaag
 ccgctggaggagcagctacacagcagctaccgtgtggtcagctctcaccgtctgcaccagagctggctgaatggcaagga
 gtacaagtcgaaggtctccaacaagccctccagccccatcgagaaaacaatctccaagccaaaggcagccccgagAAC
 cacaggtgtacacctgtccccatccggatgagctgaccaagaaccaggtcagcctgactgctgtgtcaaggctctatcc
 30 cagcgacatcgctggagtgaggagagcaatggcagccggagacaaactacaagaccacgctccgtgtgtgactccgac
 ggctctctctctctacagcaagctcaccgtggacaagagcaggtggcagcagggaacgtctctcatgtccgtgtgcatga
 ggtctgtgcacaaccactacacgcagaagagcctctctgtctccggtaaatgatctaga

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2H7 scFv MH (SSS) MCH2WTCH3 (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSVMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
 5 FNPPTFGAGTKLELKDGGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
 ASGYFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
 TAYMQLSSLTSEDSA VYFCARVVYYSNSYWFYDVGWGTGTTVTVSSDQEPKSSDK
 THTSPSPAPELLGGSSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYV
 DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYCKVSNKALPAPIE
 10 KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
 NYKTTTPPLVDSGFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
 PGK

5B9 scFv MTHWTCH2CH3 (nucleotide sequence) (SEQ ID NO: __)

15 aagcttgcgccatgagggtctctgctcagctctgggctgcttgctcctggatccctggatccactgcagatattgtgagacgca
 ggctgcatctccaatccagtcactcttgaacatcagctccatctcctgcaggctctagtaagagctcctcatagtaaatggcatca
 ctatttattgtgtafctgcagaagccaggccagctcctcagctcctgattatcagatgtccaacctggcctcaggagtcaccagaca
 ggctcagtagcagtggtgcaggaaactgatttcacactgagaatcagcagagtgaggctgaggaatgtgggtgtttattactgtgctc
 aaatctagaactcgcctcagcttgcgtgctgggaccaagctggagctgaaacgggtggcggtgctcggcggtgtgtgggt
 20 cgggtggcgccgcatgclacaggtgcagctgaagcagtcaggacctgcctagtgagctcctcacagagcctgtccatcaact
 gcacagctctctgtttctcattactaactatgctgtacactgggttcgccagctcctcaggaaagggtctgagtggtgggagtgat
 atggagtggtggaatcacagactataatgcagcttccatccagactgagcatcaccaaggacgattccaagagccaagtgtttt
 aaaatgaacagctctgcaacctaatgacacagccatttattactgtgccagaatgggggtgataaactaccttattactatgctatgga
 ctactgggtcgaaggaaactcagtcaccgtctcctctgatcaggagcccaatctctgacaaaactcacacatccccaccgtccccc
 25 agcacctgaaactcctggggggaccgtcagcttctctctcccccaaaacccaaggacacccctcatgctccggagccctgag
 gtcacatcgctgtgtgtggcgtgagccacgaagacctgaggtcaagttcaactgtacgtggagggcgtggaggtgcataat
 gccaaagcaaaagccggggagagcagctacaacagcagctaccgtgtgtgcagcgtcctcaccgtcctgcaccaggagctggt
 gaalggcaaggagtagaactgtcaaggctctccaacaaagccctccagcccccatcgagaanaacatccaaagccaaagggc
 agccccgagaaccacaggtgtacacctgccccatccgggatgagctgaccaagaaccaggtgacgtgacctgctgtgtca
 30 aagcttctatcccgagacatcgccgtggaagtgggagagcaatgggcagccggagaaacactacaagaccacgctccctgtg
 ctggactccgaggtcctctctctctacagcaagctaccgtggacaagagcaggtggcagcaggggaacgtcttctcatgctc
 cgtgagcatgaggtctgcacaaccactacagcagaagacctctcctgtctccgggtaaatgactaga

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5B9 scFv MTHWTC2CH3 (amino acid sequence) (SEQ ID NO: __)

MRFSAQLLGLLVLPWGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLHSNGITY
LYWYLQKPGQSPQLLIYQMSNLASGVDPDRFSSSGSGTDFTLRISRVEAEDVGVVYYC
5 AQNLELPLTFGAGTKLELKRGGGSGGGSGGGSSQVQLKQSGPGLVQSSQSL
ITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWVSGGTDYNAAFISRLSITKDDSK
SQVFFKMNSLQPNDAIYYCARNGDNYPYVYAMDYWGQGTSTVTVSSDQEPKSS
DKTHTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNW
YVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYCKCKVSNKALPA
10 PIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP
ENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFVMSHHEALHNHYTQKSLS
LSPGK

Human IgG1 hinge mutations

2H7 scFv- MTH (CSS) WTC2CH3 (nucleotide sequence) (SEQ ID NO: __)

15 aagcttgccgccatggatttcaagtcgagatttcagcttcctgctaatacagtgcttcagtcataaagccagagagacaattgtctct
cccagctctccagcaatcctgtctgcatctccaggggagaggtcaccaatgacttcagggccagctcaagtgttaagtacatgcatc
ggtaccagcagaagccagatcctccccaacccctggatttatgcccatccaacccctgctctgtgagtcctctgctcgttcagtg
gcagtggtgcttggaacctctactctctcacaatcagcagagtggtgagctgaagatgctgccacttattactgccagcagtgaggtt
20 taaccacccacgttcgtgctgagaccagctgagctgaaagatggcggtgctcggcggtgctgagctgagagagtg
ggagctctcaggttactacagcagctctgggctgagctggtgagccctgggctcagtgagatgctcgaagctctctggc
tacacattaccagttacaatgactcgggtaagcagacacctagacagggcctggaatggatggagctattatccaggaat
ggtgatactctacaatcagaagttcaaggcgaagccacactgactgtagacaaatctccagcagcctacatgcagctcag
cagcctgacatctgaagactctgcgcttattctgtgcaagagtggtgtactatagtaactcttactgtgactctgagctctgggcac
25 agggaccacgttcacgtctctctgatcagagcccaaatctgtgacaaaactcacacatcccaccgtccccagacctgaac
tctctggggggaccgtcagcttctctctcccccaaaacccaaggacaccctcatgatctccgggacctgaggtcacatcgctg
gtggtggagcgtgagccacgaagccctgaggtcaagttcaactggtagctggacggcgtggaggtgcatatagccaagacaaag
ccgcggggagagcagtagtaacaacagcagctaccgtgtgtgacgctcctaccgtctgcaccagcagctgctgaatggcaagga
gtacaagtgcaaggtctccaacaagccctccagcccccagagaaaactctcaagccaaaggcgagccccgagAAC
30 cacaaggtgtacacctgccccatccgggatgagctgaccaagaacagtgacgctgacctgctgtgctcaaggtctctatcc
cagcgacatcgcctggagtgagagcaatgggcagccggagagaacactacaagaccacgcctcccgctgctgactccgac

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ggctctcttctctacagcaagctcaccgtggacaagagcagggtggcagcaggggaacgtcttctcatgctccgtgatgcalga
ggctctgcacaaacctacacgcagaagagcctctcctgtctccgggtaaatgatctaga

2H7 scFv- MTH (CSS) WTCH2CH3 (amino acid sequence) (SEQ ID NO: __)

5 MDVQVQIFSLILISASVIIARGQIVLSQSPAILASAPGEKVTMTCCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGGTSYSLTISRVEAEDAATYYCQQWS
FNPTFGAGTKLELKDGGGSGGGGSGGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQIPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDASVYFCARVVYYNSNYWYFDVWGTGTTVTVTSSDQEPKSCDK
10 THTSPSPAPELLGGPSVFLFPPKPKDITLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVENAKTKPREQYNSTYRVVSVLTVLHQDWLNGKEYCKCKVSNKALPAPIE
KTISKAKGQPREPQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSVMSHEALHNHYTKQKSLSL
PGK

15

2H7 scFv- MTH (SCS) WTCH2CH3 (nucleotide sequence) (SEQ ID NO: __)

aagcttgcgcccatggatttcaagtcagatttcagcttctgctaatacagtgcttcagtcataaattgccagaggacaantgttctct
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ggfaccagcagaagccagatctccccaaacctggatttatgcccatccaacctgcttctgagagtcctgtctcgttcagtg
20 gcagtggtgtctggacctcttactcttcacaatcagcagagtggaagctgaagatgctgcaccttattactgccagcagtgaggtti
taaccarccacgttcggtctgtggaccagctggagctgaagatggcgtgtgctcggcggttggtggtctggaggaggtg
ggagctctcaggttactacacagctctggggctgagctgtgaggcctggggcctcagtggaagatgtctcgaaggcttcggc
tacacatttacagttacaatagcactgggtaaagcagacacctagacaggcctggaatgagtgatattatccaggaat
ggfagatactctacatacagaagttcaaggcgaaggccacctgactgtagacaaatctccagcagacctacatgcagctcag
25 cagcctgacatctgaagactctgcggtcttactgtgcaagagtggtgtaclalagtaacttactgtgtaacttgatgtctgggacac
aggggaccacggfaccgtctctctgatcaggagcccaaatctctgacaaaatcacacatgccaccgtccccagcactgaac
tctgtgggggaccgtcagcttctctctcccccaaaacccaaggacacctctatgatctcccgaccctgaggtcacatgcgtg
gtgtgtgacgtgagccacgaagacctgaggtcaagtcaactgtgacgtgagcggcgtgaggtgcataatgccaaagcaaa
ccgcgggaggagcaggtacaacagcagctaccgtgtgtgacgtgctcaccgtctgaccaggagctggctgaatggcaaggga
30 gtacaaggtcaaggctccacaagaagccctccagccccatcagaaaaaatctcacaagccaagggcagccccgagaac
cacaggtgtacacctgccccatccgggatgagctgaccaagaaccagggtcagcctgacctgctgtgacaaaggctctatcc

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cagcgacatcggcgtggagtgagagcaafggcgagccggagacaactacaagaccacgcctccgctgctggactccgac
ggctcctctctctctacagcaagctcaccgtggacaagagcaggtggcagcagggggaacgctctcatgctccgtgatgatga
ggctctgcacaaccactacacgcagaagagcctctccctgctccgggtaafgatctaga

- 5 **2H7 scFv- MTH (SCS) WTCH2CH3 (amino acid sequence) (SEQ ID NO: __)**
MDFQVQIFSLILISAVIIARGQIVLSQSPAILASPGKEVMTTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
10 TAYMQLSSLTSEDSAVYFCARVYYNSYWYFDVWGTGTTVTVSSDQPEKSSDK
THTCPPAPPELLGGPSVFLFPPPKPDKTLNISRTPEVTCVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNYHTQKSLSL
15 SPGK

2H7 scFv- MTH (SSC) WTCH2CH3 (nucleotide sequence) (SEQ ID NO: __)

- aagcttccgccatggaatttcaagtgcaatttcaagcttctgctaatcagtgcttcagtcataaagccagaaggacaattgttctct
cccagctctccagcaatctgtctgcatctccagggaagggcacaatgactgcagggccagctcaagtgaagttacatgcact
20 ggtaccagcagaaggccagatcctccccaaacctggaattatgccccaccaactggcttctggagctcctgctgctcagtg
gcagtggtgctggacccttactctctcacaatcagcagaagtggagctgaagatgctgccacttactgccagcagtgagatt
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ggaagctcagggcttactacagcagctcgggctgagctggtgagggcctggggcctcagtgagatgtctcgaaggtcttggc
tacacattaccagttacaatagcactgggtaaacgacacacctagacaggcctggaatggattggagctattatccaggaat
25 ggtgatactctacatacagaagttcaaggcgaaggccacactgactgtagacaatctccagcagacgctacatgcagctcag
cagcctgacatctgaagactctgcggtctatttctgtgcaagagtggtgtactatagtaactcttactgctactcagatgctgggac
aggggaccacggtaacctctctctgatcaggagcccaaatctctgacaaaaactcacacatccccacctgcccagcactgaac
tcttgggggaccgctcagctctctctctcccccaaaacccaaggacacctcatgactcccgaccctgaggtcacatgcgtg
gtgtgtgacgtgagccacgaagacctgaggtcaagttcaactggtacgtggagcgcgtggaggtgcataatgccaaagaaa
30 ccggggagggagcagtaaacacagcagctaccgtgtgtgacgcgtctccacgcgtccaccaggactgctgaatggcaaggga
gtacaagtgcgaagtctccacaanaagcctccagcccccctcagaaaacaatctccaaagccaaaggcgagcccgagac

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cacagggtgtacacctgcccccacccgggagtgagctgaccaagaaccagggtcagcctgacctgcctggtcaaggcctctatcc
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ggctcctctctctacagcaagctcaccgtggacaagagcagggtggcagcagggaacgctctctcatgctccggtgatgcatga
ggctctgcacaaccactacacgcagaagacccctctccctgctccgggtaaatgatctaga

5

2H7 seFv- MTH (SSC) WTCH2CH3 (amino acid sequence) (SEQ ID NO: __)

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSPGKVTMTCRASSVSVMHWY
QKQPGSSPKPWIYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
10 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSNYWYFDVWGTGTTVTVSSDQEPKSSDK
THTSPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWY
VDGVEVHNAAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP
15 NNYKTTTPVLDSGDFLYSKLTVDKSRWQQGNVSCSVMHEALHNHYTQKSLSL
SPGK

HlgGMHcys1 (nucleotide sequence) (SEQ ID NO: __)

gtt gtt gat cag gag ccc aaa tct tct gac aaa act cac aca tg

20

HlgGMHcys2 (nucleotide sequence) (SEQ ID NO: __)

gtt gtt gat cag gag ccc aaa tct tgt gac aaa act cac aca tct cca cgg tgc

HlgGMHcys3 (nucleotide sequence) (SEQ ID NO: __)

25 gtt gtt gat cag gag ccc aaa tct tgt gac aaa act cac aca tct cca cgg tcc cca gca cct

HuIgG1 MTCH3Y405 (nucleotide sequence) (SEQ ID NO: __)

gggcagcccccagaaaccagggtgtacacctgcccccacccgggaggagatgaccaagaaccagggtcagcctgacctgcct
ggtcaaggcctctatccagcgacatcgccgtggagtgaggagcaatgggcagccggagacaactacaagaccacgcctc

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ccggtgctgactccgacggctcctctacctctatagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctc
atgctccgtgatgatgaggtctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

HuIgG1 MTCH3Y405 (amino acid sequence) (SEQ ID NO: __)

- 5 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTP
VLDSGDSFYLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1 MTCH3A405 (nucleotide sequence) (SEQ ID NO: __)

- gggcagccccgagaaccacaggtgtacacctgcccccattccgggagagatgaccaagaaccaggctcagcctgacctgcct
10 ggtcaaaaggctctatccacgcgacatcgccgtggagtgggagagaatgggcagccggagaacaactacaagaccacgcctc
ccgtgctggactccgacggctcctctccctctatagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtcttctc
atgctccgtgatgatgaggtctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

HuIgG1 MTCH3A405 (amino acid sequence) (SEQ ID NO: __)

- 15 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTP
VLDSGDSFALYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1 MTCH3A407 (nucleotide sequence) (SEQ ID NO: __)

- Gggcagccccgagaaccacaggtgtacacctgcccccattccgggagagatgaccaagaaccaggctcagcctgacctgcc
20 tggcaaaaggctctatccacgcgacatcgccgtggagtgggagagaatgggcagccggagaacaactacaagaccacgcct
ccgtgctgactccgacggctcctcttctctccgaccaagctcaccgtggacaagagcagtggtgcagcaggggaacgtcttctc
catgctccgtgatgatgaggtctctgcacaaccactacacgcagaagagcctctccctgtccccgggtaaatga

HuIgG1 MTCH3A407 (amino acid sequence) (SEQ ID NO: __)

- 25 GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTP
VLDSGDSFFLASKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

HuIgG1 MTCH3Y405A407 (nucleotide sequence) (SEQ ID NO: __)

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gggcagccccgagaaccacaggtgtacacctgccccatccccggaggagatgaccaagaaccaggtcagcctgacctgctt
ggtcaaggcttctatccagcgacatcgccgtggagtgaggagagcaatggcgaccggagaacaactacaagaccacgcctc
ccgtgctgactccgacggctccttctactcgcagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctc
atgctccgtgatgatgaggtctgcacaaccactacacgcagaagagcctctcctgtccccgggtaaatga

5

HuIgG1 MTCH3Y405A407 (amino acid sequence) (SEQ ID NO: __)

GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSGDGFSYLASKLTVDKSRWQQGNVFCSCVMIEALHNIHYTKSLSLSPGK

10 **HuIgG1 MTCH3A405A407 (nucleotide sequence) (SEQ ID NO: __)**

gggcagccccgagaaccacaggtgtacacctgccccatccccggaggagatgaccaagaaccaggtcagcctgacctgctt
ggtcaaggcttctatccagcgacatcgccgtggagtgaggagagcaatggcgaccggagaacaactacaagaccacgcctc
ccgtgctgactccgacggctccttgcctcgcagcaagctcaccgtggacaagagcagcaggtggcagcaggggaacgtctctc
catgtccgtgatgatgaggtctgcacaaccactacacgcagaagagcctctcctgtccccgggtaaatga

15

HuIgG1 MTCH3A405A407 (amino acid sequence) (SEQ ID NO: __)

GQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
VLDSGDGSFALASKLTVDKSRWQQGNVFCSCVMIEALHNIHYTKSLSLSPGK

20 **2H7 scFv MTH (SSS) WTCH2MTCH3Y405 (nucleotide sequence) (SEQ ID NO: __)**

aagcttgcccgatggatttcaagtcagatgtttagcttctgtaatacagtgcttcatgataattgacagagcaaatgttctt
ccagctccagcaatcctgctgcatctccaggggagaaaggtcacaatgacttgcaggccagctcaagtgttaattacatgcact
ggtaccagcagaagccagatctcccccaaacctggatttatgcccatccaacctggcttctgagtgcttccctgctcgttcagtg
gcagtggtgcttggacccttactctctcacaatcagcagagtgtaggctgaagatgctgccatttatctccagcagtgaggatt
25 taaccacccacggttcgtgctgggaccaagctggagctgaaagatggcgggtgctcggcggtggtggtatcggaggaggtg
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tacacattaccagttacaatatgcactgggtaaacgagacacctgacagggcctggaatggattggagctatttatccaggaaat
ggtgatacttctacaatcagaagttaagggcaaggccacactgactgtagacaatatctccagcagagcctacatgcagctcag
cagcctgacatctgaagactctgcgtctatttctgtgcaagagtggtgtactatagtaactcttacttggtacttcgatgtctgggcac
30 agggaccacggctaccgtctctctgatcaggagcccaaatcttgacaaaactcacacatccccaccgtccccagcacctgaac

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tcttgggggagcgtcagcttctcttcccccaaaacccaagacacctcatgatctccggacctcctgaggtcacatgcgtg
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ccggcgaggagcagtagtaacaacacgctaccgtgtgtgtcagctctcaccgtctgcaccaggactggctgaalggcaagga
gtacaaggtgcaaggtctccaacaagccctccagccccatcgagaaaacaatctcaagccaaaggcgagccccgagaac
5 caccaggtgtacaccccgccccatccgggaggagatgaccaagaacaggtcagcctgacctgctgctcaaggctctatcc
cagcgacatcgccgtggaggtggagagcaatggcgagccggagacaacacagaccacgctccgtgctgactccgac
ggctctcttctacatctatagcaagctcaccgtggacaagagcaggtggcagcaggaggacgtcttctcatgctccgtgatgatga
ggctctgcacaaccaactacacgcagagaagcctctcctgtccccgggtaalgatctaga

- 10 **2H7 scFv MTH (SSS) WTCH2MTCH3Y405 (amino acid sequence) (SEQ ID NO: __)**
MDFQVQIFSLFLISASVIIARGQIVLSQSPAILASAPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIIAPSNLASGVPARFSGSGSGTSTSYLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGSGGGSSQAYLQQSQAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
15 TAYMQLSSLTSEDSAVYFCARVYYNSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
THTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVEVHNATKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKKTTPPVLDSDGSFYL SKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSLS
20 PGK

- 2H7 scFv MTH (SSS) WTCH2MTCH3A405 (nucleotide sequence) (SEQ ID NO: __)**
aagcttgccgccattggaatttcaagtcgaatttcagctctctgaatcagtgcttcagtcataatgccagaggacaaattgtctct
cccagctccagcaatcctgtctgcatctccaggggagaaagtcacaatgactgcaaggccagctcaaggtgaatgtacatgcaat
25 ggtaccagcagaaggccaggaatctcccccaaacctggatttatgcccatccaacctggcttctggagtcctctcgtcgttcagtg
gcagtggtgctgggacccttactctctcacaatcagcagagtgaggagctgaagatgctgcccatttactgccagcagtgaggtt
taaccacccacgttctggtgctggaccacagctggagctgaagatggcggctggcctggcgctggagctggaggagggtg
ggagctctcagcgttatcagcagctctgggctgagctgggtgagcctggggcctcagtggaagatgctcgaaggctctggc
tacacattaccagttacaatagcactgggttaaagcagacacctaagacggcctgggaatggattggagctatttaccaggaat
30 ggtgtatctctcacaatcagaagttcaaggcgaaggccacactgactgtagacaatactccagcagacgctacatgcagctcag
cagcgtcagatctgaagactctgcgtctattctgtgcaagagtggtgtactatagtaactcttactggtacttcgatgtctggggcac

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aggaccacggcaccgtctctctgacaggagcccaatctctgacaaaactcacatccccaccgtccccagacctgaac
tcttggggggaccgtcagcttctcttccccaaaacccaaggacacctcatgatctccggacccttgagtgcatcagctg
gtggtggagctgagccacgaagacctgaggtcaagttcaactgggtacgtggacggcgtggaggtgcataalgccaaagacaag
ccggcgagagagcagctacaacagcacgtaccgtgtggtcagcgtcctcaccgtcctgcaccaggactggctgaatggcaaggga
5 gtaacaagtgcagggtctccaacaaagccctccagccccatcagagaaaacaatctccaagccaaaggcgagcccgagagaac
cacagggtgacacctgtccccatccggagaggatgaccaagaaccaggtcagcctgacctgctggtaagggtcttctatcc
cagcgacatcgccgtggagtgaggagcaatggcgagccggagaaactacaagaccgctcccgctgctgacatccgac
ggctccttcgccctctatagcaagctcaccgtggacaagagcaggtggcagcagggaacgtcttctcatgctccgtgatgatga
ggctctgcacaaccactacacgcagaagagcctctcctgtccccgggtaaatga

10

2H7 scFv MTH (SSS) WTCH2MTCH3A405 (nucleotide sequence) (SEQ ID NO: __)

mdfqvqifslisasviiaqgqvlsqspailsaspgkvmttcrassvsymhwyqqkpgsspkpwiypsnlasgvparf
sgsgsgtsysltisrveadaatyycqgwsfnptfgagtklelkdgsgsgsgsgsgssqaylqqsgaelvrpgasvkmnc
kasgtytfsynmhvwktpqrqglewigaiypngdtsynqkfkgaatlvdksstaymqsltsedsavfcarvvyvsn
15 sywyfdvwtggtvttvssdqepkssdkthtspspapellggpsvflfpkpkdltmisrpevticvvvdshdedpevkfnw
yvdgvevhnaktfpreeqymstyrvsvltvlhqdwlngkeykckvsnkalpapiektiskakgqprepvyvllppsreemt
knqvslctlvkgfypsdiavewesngqpennyktpvldsdgsfalysklitvdksrwqqgnvfscsvmhcalhnhytqksl
slspgk

20 **2H7 scFv MTH (SSS) WTCH2MTCH3A407 (nucleotide sequence) (SEQ ID NO: __)**

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ggtaccagcagaaggccagatcctccccaaacctggatttatgcccaaccaacctggcttcggagticcgtctcgtcgttcagtg
gcaatgggtctgggaccttctctctcacaatcagcagatggaggtgaagatgctgccacttattactgccagcagtggaattt
25 taaccacccacagttcggtgctgggaccaagctggagctgaaagatggcgtggctcggcggcgtggtggtatctggaggaggtg
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cagcctgacatctgaagactctcggctctatttctgtgcaagagtggtgtactatagtaacttacttggtactcagatgctggggcac
30 agggaccacggcaccgtctctctgacaggagcccaatctctgacaaaactcacatccccaccgtccccagacctgaac
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gtgggtggacgtgagccacgaagacctgaggtcaagttcaactgtacgtggacggcgtggaggtgcataaagccaagacaaaag
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5 cagcgacatcgccgtggagtgaggagcaatggcgagccggagaaacaactacaagaccagcctccctgctgtgactccgac
ggctcctctctcctccagcaagctcaccgtggacnaagcgaggtggcagcggggaacgtctctcatgctcgtgatgcatga
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2H7 scFv MTH (SSS) WTCH2MTCH3A407 (amino acid sequence) (SEQ ID NO: __)

10 MDFQVQIFSFLISASVIIARGQIVLSQSPAILASPGKEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWIIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
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ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYYSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
15 THTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYV
DQVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPPVLDSDGSFFLASKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLS
PGK

20

2H7 scFv MTH (SSS) WTCH2MTCH3Y405A407 (nucleotide sequence) (SEQ ID NO: __)

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30 ggtgatacttctacaatcagaagttcaaggccaaggccacactgactgtagacaaaatctccagcacagcctacatgcaagctcag
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aggggaccacgggtcaccgtctctctgatcaggagcccaatctctgcacaaactcacacatcccaccgtgccagacctgaac
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cacagggtacacctgccccatcccgggaggagatgaccaagaacacgtcagctgacctgacctgtcaaaggctctatcc
cagcgacatcgcctgtgagtgaggagacaaatgggacgccggagaaacaactacaagaccagctccgtggtgactccgac
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2H7 scFv MTH (SSS) WTCH2MTCH3Y405A407 (amino acid sequence) (SEQ ID NO:)

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 FNPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
 TAYMQLSSLTSEDSAVYFCARVYYYSNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
 THTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYV
 DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
 20 KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
 NYKTTPTPLDSDGSFYLASKLTVDKSRWQQGNVFSQVMHEALHNHYTQKSLSLS
 PGK

2H7 scFv MTH (SSS) WTCH2MTCH3A405A407 (nucleotide sequence) (SEQ ID

25 NO:)

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 ggaagctctcagcgttactcaacagctctgggctgaactgtgaagcctctggcctcagtgaaagatctctcacaagctcttgc
 30

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tacacattaccagttacaatafgcactgggtaaaagacacactagacaggccctggaatggatggagctattatccaggaaat
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 5 tctggggggaccgtcagctctctctctcccccacaaacccaaggacacccctcatgatctcccggacccctgaggtcacatcgctg
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 cacaaggtgtacacccgtccccatccggggagagatgaccaagaaccagggtcagcctgaactgacctgggtcaaaaggcttctatcc
 10 cagcgacatcgccgtggagtgaggagacaatggcgagccgggaacaactacaagaccacgctcccggtcgtgactccgac
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2H7 scFv MTH (SSS) WTCH2MTCH3A405A407 (amino acid sequence) (SEQ ID

15 **NO: 1)**
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 FNPPTFGAGTKLELKDGGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
 20 TAYMQLSSLTSEDSAVYFCARVYYNSYWFYFDVWGTGTTVTVSSDQEPKSSDK
 THTSPSPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYV
 DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
 KTISKAKGQPREPQVYTLPPSRBEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
 NYKTTTPVLDSDGSFALASKLTVDKSRWQQGNVFSQSVMEALHNHYTQKSLSL
 25 PGK

2H7 scFv MTH (SCC) WTCH2CH3 (nucleotide sequence)

aagcttgcgccatggaatttcaagtgcaagtttcaagctctctgtaatacagtgctcagtcataattgccagaggacaaattgtctct
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 30 ggtaccagcagaagccagatctcccccacccctggatttatgcccatcaacctgctctcggagctccctgctcgtctcagtg
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taaccaccaccagcttcggctcgggaccaagctggagctgaaagatggcggctggcggctggctggaatcctggaggaggtg
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5 cagcctgacatctgaagactctgcgctctattctgtgcaagagtggtgactatagtaactcttactgtaactcctatgctggggcac
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10 gtacaagttcaaggtctccaacaagccctccagcccccactcgagaaaacaaatccaaagccaaaggcagccccgagaaac
cacagggtgacacctcgtcccccacccggatgagctgaccaagaaccaggtgcagcctgacctgctggtcaaggctctatcc
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15

2H7 scFv MTH (SCC) WTCH2CH3 (amino acid sequence)

MDFQVQIFSLISASVIIARGQIVLSQSPAILASAPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
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20 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYYSNSYWFYDVGWGTGTTVTVSSDQEPKSSDK
THTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREBQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
25 NNYKTTTPVLDSGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSL
SPGK

2H7 scFv MTH (CSC) WTCH2CH3 (nucleotide sequence)

aagcttgcgcccatggaatttcaagtcagatfttcagcttctgctaatcagtgcttcagctacataatgccagaggacaaattgtctct
30 cccagctccagcaatctctgctcatctccaggggagaggtcacaatgacttcgagggccagctcaagtgtaagtacatgcact
gtgaccagcagaagccagatctctccccaacacctggattatgcccatcaacctggcttcggagctcctgctcgtctcagtg

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15

2H7 scFv MTH (CSC) WTCH2CH3 (amino acid sequence):

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25

2H7 scFv MTH (CCS) WTCH2CH3 (nucleotide sequence)

30

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ggtaccagcagaagccagatctccccaaacctggattatgcccatccaacctgctcttgagtcctctctcgtctcagtg
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5 tacacattaccagttacaatgatcactgggtaagcagacactagacaggcctggaatggattggagctattatccaggaaat
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10 gtgtggagctgagccacgaagacctgaggtcaagttcaactgtgtacgtggcggcgtggaggtgcataatgccaaagacaag
ccggcgaggagcagctacaaacagcagctaccgtgtgtcagcgtctcaccgtctgcaccaggacgtggctgaatgcaaggga
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15 ggtctctctctctacagcaagctcaccgtggacaagcaggtggcagcaggggaaagctctctcatgctccgtgatgcatga
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2H7 scFv MTH (CCS) WTCH2CH3 (amino acid sequence)

MDFQVQIFSLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSVSVMHWY
20 QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPTTFGAGTKLELKDGGGSGGGSGGGSSQAYLQQSQAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSNSYWYFDVWGTGTTVTVSSDQEPKSCDK
THTCPPAPPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWY
25 VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSSVMHEALHNHYTQKSLSL
SPGK

30 **HuIgAHlgA-T4-ORF (nucleotide sequence)**

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gtatcagccaggttcctcaactccacaccccatctccctcaactccacctaccccattccctcatgctgccacccccgactgtca
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5 cgtlaaccggcaccctctcaaaatcgggaacacattccgcccgaggtccacctgtgccgccccctcggaaggagctggccc
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10 ac

HuIgAHlgA-T4-ORF (amino acid sequence)

DQVPVSTPTPTSPSTPTPTSPSCCHPRLSLRPALEDLLGSEAILTCTLTGLRDSGV
TFTWTPSSGKSAVQGPDRDLGCGYSVSSVLPGCAEPWNHGKFTTCTAAYPESKT
15 PLTATLSKSGNTRFRPEVHLLPPPSEELALNELVLTCLARGFSPKDVLRVRLQGSQ
ELPREKYLTWASRQEPSQGTTFATVTSILRVAEDWKKGDTFSCMVGHEALPLAF
TQKTDRLAGKPTHVNVSVVMAEVDADPSN

1D8-IgAH IgA-T4-CD80 (nucleotide sequence)

20 aagccttatggaatttcaagtcgagatttcagcttctcgtatcaagcttcagtcataatgtccagagagtcgacattgtgtcactc
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30 ccgaccggccctcgaggacctgctcttaggttcagaagcgatctcagctgcacactgaccggcctgagagatgcctcaggtctc
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cgagctgggtgacgctgacgtgacctggcacgtggttcagcccaaggaatgtgtgttcgctgctgcaggggtcacaggagct
gcccgcggaagaagtactgacttggcatcccgacgagggccagccaggggaccaccacctctcgtgtgaccagcatactgc
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aagaccatcgaccgttggcgggtaaacccacctatgcaatgtgtctgttgcacggcgaggtggacgggaltctcgaacaa
cctgtcccatctcgggccattacctaatactcagtaaatggaaattttgtgatatgctgacctactgcttggcccaagatgcag
agagagaaggaggaatgagagattgagaagggaagtgtacgccctgtataaatacgatac

AA

10 **ID8 scFv IgAH IgA-T4-CD80 (amino acid sequence)**

MDFQVQIFSFLLISASVIMSRGVDIVLTQSPTTIAASPGKEVVTITCRASSVSVMYWY
QQKSGASPKLWYDTSKSLASGVPNRFSGSGSGTSYSLAINTMETEDAATYYCQW
SSTPLTFSGTGKLEIKRGGGGSGGGSGGGSGVQLKEAGPGLVQPTQLSLTCTV
SGFSLTSDGVHWIRQPPGKGLEWMGIYYDGGIDYNSAIKSRLSISRDTSKSQVFLK
15 INSLQTDITAMYYCARIHFDYWGQGVMTVSSDQVPSPPTPTSPSTPPTPSPSCC
HPRLSLHRPALEDLLLGSAILTCLTFLGRDASGVTFWTWPSSGKSAVQGPDRDL
CGCYSVSSVLPGAEPWNHGTKFTCTAAYPESKTPLTATLSKSGNTFRPEVHLLPP
PSEELALNELVTLTCLARGFSKPDVLVRWLQGSQELPREKYLTWASRQEPSQGT
FAVTSILRVAEDWKKGDTFSCMVGHEALPLAFTQKTIDRLAGKPTHVNVSVVM
20 AEVDADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRRRRNRRLRRESVRPV

human IgE Fc (CH2-CH3-CH4) ORF (nucleotide sequence)

tgatcacgtctgtctccagggaacttaccgccaccgtggaagatttaccatgctgctctgcgacggcgccggcggaacttccccg
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25 tggactgtgccaccgctctaccacgacgaggggtgagctggctccacacanaagcgagctaccctcagccagaagaactggc
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30 ccagtcgaggtgaccacccccacctgccaggccctcatgcgtgccacgaccaagaccagcggcccgctgctgccccg
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gaggacatctcgggtgcagtgctgcacaacgaggtgcagctcccgagcccgccagacacgacgagccccgcaagacc
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tcatgaggcagcgagccccacagaccgtccagcgagcgggtgtctgtaaatcccggtaaagcggatccttcgaa

AA

- 5 **human IgE Fc (CH2-CH3-CH4) ORF (amino acid sequence)**
DHVCSRDFTPPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDV
DLSTASTTQEGELASTQSELTLSQKHWLSDRITYTCQVITYQGHTFEDSTKKCADSN
PRGVSAYLRSRPSFDFLIRKSPITITCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKE
EKQRNGTLTVTSTLPVGRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPE
- 10 VYAFATPEWPGSRDKRTLACLIQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTK
GSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGKADPS

ID8 scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

- aagctatggatttcaagtcagatttcaagcttctgtaatacagtgcttcagtcataatgtccagaggagtcgacattgtctcactc
- 15 agtctccaaacaacctatagctgcatctccaggggagaaagtcacacatcaccctggcgtgcaggtccagtgtaagttaactgtaactgtg
accagcagaagtcagcggcctcccccataactctggattatgacacalccaaagctgcttctggaggtlccaaatcgcttcagtgga
gtgggtctgggacctcttattctctcgaatcaacacctgagagactgaagatgctgccaacttallactgtcagcagtgaggatgtact
ccgtcacgttcgggtctgggaccaagctggagatcaaacgggggtggcggcggcgggtgggtgggtgggtgggtggcggcg
gatctcagtgtagctgaaggaggcaggacctggcctggtgaaccgacacagacctgtccctcacatgcactgtctctgggtt
- 20 ctcatataaccagcgatggtgtacactggattcagacgctccaggaagggtctggaatgagggaalaaatattatgaggag
cacagattataatcagaattaaatccagactgagcatcagcaggacacctccaaagagccaagtgtttctaaaaatcaacagtctg
cnaactgatgacacagccatgtattactgtccagaatccactttgattactggggccaaggagtcagtgcaactgtctctgac
acgtctgtccagggtacttccccccaccgctgaagattctacagtgctctcgtgcagggcgccggcgaacttccccccaccat
ccagctcctgtgctctgctctgggtacacccagggactatcaacatcactgggtggagagacggcaggtcatgagacgtggac
- 25 ttgtccaccgctctaccacgcaggagggtgagctggcctccacacaaaagcagctcaacctccagccagagacatggcgtgca
gaccgcacctacacctgacagtgacactatcaagggtcacacctttgaggacagccaaagaagtgtgacagattcaaccgcagag
gggtgagcgctacctaaagccggccagcccttgacacctgttctccgcaagtcgccacgacacctgtctgtgtggtgaccl
ggcaccacgaagggggacctgtgaacctgacctggtccgggccaagtgggaacctgtgaaccacttcaccagaaaggaggag
aagcagcgcaatgacgtttaaccgtcacgtccacctggcgggtggcaccggagactggatgagggggagacactaccagtg
- 30 cagggtgacccacccccacctgccaggggcctcatgctggtccacgaccaaggaccagcgcccggtgtgctgcccgggaagtct
atgcgtttgcgacgccgaggtggcggggagccgggacaagcgaccttcgctgctgattccagaattcatgctgaggac

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atctgggtgcagtggtctgcacacgagggtgcagctcccggagcccccggcacagcacgacgagccccgaagaccaagggct
ccggctctctcgtcttcacgccgcctggagggtgaccaggccgaatgggagcagaagatgagttcatctgccgtgcagtcctatga
ggcagcgagccctcagacaccgtccagcgagcgggtgctgtaaatcccgtaaagcggatccttcgaagctcccatctcgggc
cattacctaatctcagtaaatggaatttttgatgctgctgacctactgctttgcccccaagatgcagagagagaaggaggaatg
5 agagattgagaagggaagggtgtacgcccctgtataaatcgata

1D8-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)

MDFQVQIFSLFLISASVMSRGVDIVLTQSPPTTIAASPGKEVITICRASSSVSYMYWY
QQKSGASPKLWIYDTSKLGASGVPNRFSGSGSGTSYSLAINTMETEDAATYYCQQW
10 SSTPLTFGSGTKLEIKRGGGSGGGGSGGGGSGVQLKELAGPLVQPTQTLSLTCTV
SGFSLTSDGVHWIRQPPGKGLEWMGIIYDGGTDYNSAIKSRLSISRDTSKSQVFLK
INSLQTDITAMYYCARIHFDYWGQGVMTVTVSSDHVCSRDFPTPVKILQSSCDGG
GHFPPTIQLLCLVSGYTPGTINITWLEDQVMDVDLSTASTTQEGELASTQSELTLS
QKHWLSDRITYTCQVITYQGHTFEDSTKKCADSNPRGVSAYLSRPSFDFLRKSPITI
15 TCLVVDLAPSKGTVNLTWSRASGKPVNHSTRKEEKQRNGJLTVTSTLPVGTDRDWI
EGETYQCRVTHPHLPRLMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLI
QNFMPEDISVQWLHNEVQLPDARHSTTQPRKTKGSGFFVFSRLEVTRAWEQKDE
FICRAVHEAASPQTQRAVSVNPGKADPSKLPFWAITLISVNGIFVICCLTYCFAP
RCRERRRRNERLRRESVRPV

20

5B9-IgAII IgA-T4-CD80 (nucleotide sequence)

aagcttgccgccatgagggtctctgctcagctctggggctgcttgctctggatccctgcatccactgcagatattgtgatgacga
ggctgcattctcaatccagtcactcttggaacatcagcttcaatctcctgcagctctagtaagagctctccatagatgaatggcatca
cttattgtattgtaictgcagaagccaggccagctctcctcagctcctgatttatcagatgtccaaacctgcctcaggagtcaccagaca
25 ggttcagtagcagtgggcagggaactgatttcacactgagaatcagcagagtgaggagctgagagatgtgggtttattactgtgctc
aaaatctagaactccgctcagcttcggtgctgggaccaagctggagctgaaacggggtggcgtggctcggcggtgtgtgggt
cgggtggcggcgatgctcagagtgagcgtgaagcagtcaggacctggcctagtgcagctcctcacagagcctgtccatcacct
gcacagctctctggtttctcatfaactacctatgctgtacactgggttcgccagctccaggaaagggtctggagtgctgggagtgat
atggagtggtgggaatcacagactataatgcagcttccatccagactgagcatcaccagaagagcatccaagagccaagttttctt
30 aaaatgaacagctgtcgaacctaatgacacagccatttatctgtgccagaatgggggtgataactacctcttattactatgatatga
ctactgggtcaagggaacctcagtcaccgtctcctctgaltcagccagttccctcaactccactacccatctccctcaactccact

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accccattccctcatgctgccacccccgactgtcactgcaccgaccgcccctgagagacctgctcttagtgcagaaagcgaatcct
cacgtgacacactgaccggcctgagagatgcttcagggtgtcacttcacctggacgcccctcaagtgaggagagcgtgticaagga
ccacctgaccgtgacctctgtggctgtcacagcgtgtccagtgtcctgccgggctgtgccgagccatggaacctatgggaagacctt
cacttgactgtgctctaccgccgataccaagaccccgttaaccgccaccctctcaaaatccggaaacacatccggcccgagggtc
5 cactctgtgccgccgccctcgaggagctggtccctgaacgagctggtgacgctgactgctgtgacgctgcttcagccccaa
ggatgtgctgttcgtgctgtcagggtgcacaggagctgccccgcgagaagtactgacttgggcatccggcgagagccca
ggcaggggcaccaccacttcgtgtgaccagcactgctgcgtggcagccgaggactggaagaagggggacaccttctcctgc
atggtgggcacgaggccctgccgtggccttcacacagaagaccatcgaccgcttgccgggtaaacccaccatgtaaatgtgt
ctgttgcatgaggcgagggtggagcggatccttcgaacaacctgctcccatcctgggcatcttaactcagtaaatggaaatgtt
10 gtgatgctgcctgacctactgcttggccccaagatgcagagagaaggaagggaatgagagaltgagaagggaagtgtacgcc
ctgtataaatcgatac

5B9-IgAH IgA-T4-CD80 (amino acid sequence)

MRFSAQLGLLVLPWGSTADIVMTQAAFSNPVLTGTSASISCRSSKSLLSHNGITY
15 LYWYLQKPGQSPQLLIYQMSNLASGVPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGGSGGGGGSGVQLKQSGPGLVQSSQSLS
ITCTVSGFSLTTYAVHWVRQSPGKLEWLGVWSGGITDYNAFISRLSITKDDSK
SQVFFKMNSLQPNDAIYYCARNGGDNPYYYYAMDYWGQTSVTVSSDQVPVST
PPTPSPSTPPTPSPSCCHPRLSLHRPALEDLLGSEAILTCTLTGLRDASGVITFTWTPS
20 SGKSAVQGPDRDLGCGYSVSSVLPGCAEPWNHGKTFCTCTAAYPESKTPLTATLS
KSGNTFRPEVHLLPPSEELALNELVTLTCLARGFSPKDVLRWLQGSQELPREKY
LTWASRQEPSQGTTTFAVTSILRVAEDWKKGDTFSCMVGHEALPLAFTQKTIDR
LAGKPTHVNVSVVMAEVDADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRER
RRNERLRRESVRPV

25

5B9-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttgcgcccatgagggttctctgctcagcttctgggctgcttgtgctctggatccctggatccactgcagatattgtgatgacgca
ggtcgtcatctccaatcagtcactcttggaaatcagcttccatctcctgcaggtctagtgaagctctccatagatgaatggcatca
cttattgtatgtgatctgcagaagccaggccagctctccctcagctcctgattatcagatgccaaacctgctcaggagatccacagca
30 ggttcagtagcagtggtcaggaaactgattcacactgagaatcagcagagtgaggctgagatgtgggtgttattactgtgtc
aaaactcgaactccgctcagcttggctgtgggaccaagctggagctgaaacgggggtggcgtggctcggcggtgtgtgggt

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20 **5B9-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)**

355

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2e12-scFv-IgAH IgA-T4-CD80 (nucleotide sequence)

aagcttatggattttcaagtcgacattttcagcttctgtataatcagtgctcagtcataatgctcagaggagtcgacattgctcacc
aatctccagctcttggctgtgtctcaggtcagagagccaccatctctcagagccagtgaaagtggtgaataattatgtcacaagtt
5 taatgcagtggtaccacaagaaccaggacagccaccacactcctcatctctgctcatccaagtagaacttggtggctccctgcc
agggtttatggcagtggtgctggcagagactcagcctcaacatccatcctgtggaggagtgatattgcaatgtattctgtcagc
aaagtgaggaaagtgcttggcagcttggtggaggccaagctggaaatcaaacgggggtggcgtgctcgccggggagtgagg
tcgggtgcccggatctcaggtgcagctgaaggagtcaggtgacctggcctgggtggcgcctcacagagcctgtccatcacatgc
accgtctcagggtctcattaaacggctatgggtgaaactgggttcgccagcctccaggaaagggtctggagtgctgggaatgat
10 atgggggtgatggaagcacagactataattcagctctcaaatccagactgagcatcaccaaggacaactccaagaccaagtttctt
aaaaatgaacactctgcaaacatgatcacacagccagatactatgtccagagatggtatagtaactttcaactatgttatggact
actgggtcaaggaaacctcagtcaccgtctcctcagatcagccagttcctcaactccactaccatctccctcaactccacta
cccctctcctcactgtgccacccccgactgtcactgcaccgaccggccctcaggacctgtcttagtggtcagaagcgatcctc
acgtgcacactgaccggcctgagagatgcctcaggtgtcactctacctggacgccctcaagtggaagagcgctgttcacaggac
15 cactgcacgtgacctctgtgctgtacagcgtgtccaggtgtcgtcgtccggcgtgtgcgcgacccatggaacatgggaagaccttc
acttgcactgtgctcctaccggagtcgaagaccccgctaacccgacccctctcaaatccggaacacatccggcccgagggtcc
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gatgtgctgggttcgtggctgcagggtgcacaggagctgccccgcgagaagtaacctgacttggcatcccggcagagcccag
ccaggggcaccaccacttcgtgtgaccagcatctgcgcgtgcaagcogaggactggaagaagggggacaccttctcctgcat
20 gttggggccacgagggcctgccgtggccttcacacagaagaccatcgaccgttgccgggtaaacccaccatgtcaatgtgtct
gttgatctggcgagggtgagcgggatccttcgaacaacctgtccccatctggccattaccttaatctagtaaatgtgaattttgt
gatatgctgctgacctactgtttcccccaagatgcagagagagaagaggaaatgagagattgagaagggaagtgtacgccct
gtataaatcgatac

25 2e12-scFv-IgAH IgA-T4-CD80 (amino acid sequence)

MDFQVQIFSLLISASVIMSRGVDIVLTQSPASLAVSLGQRATISCRASESVEYYVTS
LMQWYQKQKPGPPKLLISAASNVESGVPARFSGSGSGTDFSLNIHPVEEDDIAMFY
CQQSRKVPWTFGGGTGLEIKRGGGSGGGGSGGGGSGVQLKESGPGLVAPSQSL
ITCTVSGFSLTGYGVNWVRQPPKGLEWLGMIWGDGSTDYNSALKSRISITKDNS
25 KSQVFLKMNSLTDDTARYYCARDGYSNFHYVMDYWGQGTSTVTVSSDQVPVS
TPPTPSPSTPPTPSPSCCHPRLSLRPALEDLLGSEAILTCTLTGLRDASGVTFWTWP
SSGKSAVQGPDRDLGCGYSVSSVLPGCAEPWNHGKFTICTAAYPESKTPLTATLS

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KSGNTFRPEVHLLPPPSEELALNELVTLTCLARGFSPKDVLRWLQGSQELPREKY
LTWASRQEPSQGTTFITFAVTSILRVAEDWKKGDTFSCMVGHEALPLAFTQKTIDR
LAGKPTHVNVSVVMAEVDADPSNNLLPSWAITLISVNGIFVICCLTYCFAPRCRER
RRNERLRRESVRPV

5

2e12-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (nucleotide sequence)

aagcttatggatttcaagtcagatttccagcttctgataatcagtgctcagtcataatgtccagaggagtcgacattgtctcacc
aatctccagcttcttggctgtgtctctaggtcagagagccaccatctcctgcagagccagtgaaagtgtgaaatattgtcacaagtt
taatgcagtggtaccacagaaacaggacagccaccacaaatctcatctctgctgcatcaacagtagaactggggctcctggc
10 aggtttatgtggcagtggtgtctgggacagacttcagcctcaacatccatcctgtggaggagatgataattgcaattgtattctgtcagc
aaagttaggaaggttcttggagctcgggtggagcaccacagctggaatcaaacgggtggcgggtgctcggcgaggagtggtg
tcgggtggcggcggaatcaggtgcagctgaaggagtcaggaactggcctgtggcgccctcacagagcctgtccatcacatgc
accgtctcaggggttctcattaacgggctatgggtgaaactgggttcgagcctccaggaagggctgtggagtggtgggaatgat
atgggtgatggaagcacagactataatcagctcctcaatccagactgagcatcaccaaggacaactccaagagccaagtgttctt
15 aaaaatgaacagctctgcaaatgtagacacagccagatactactgtgccagagatgggtatgtaacttctattactatgttagtgaact
actggggtcgaaggaaactcagtcaccgtctcctcagatcacgtctgtccagggacttcacccgccacagtcgaagattctacag
tcgtcctgcgacggcgggcgacgtcccccaccatccagctcctgtgctcgtctctgggtacacccaggactatcaaat
cacctgggtggaggaaggcaggtcatgacgtgactgtgtccaccgctctaccacgcaaggagggtgaagctggcctccacac
aaagcgagtcaccctcagccagaagcactggctgtcagaccgacctacacctgccaggtcacctatcaaggtcacacatttga
20 ggacagcaccaagaagtgtagcattccaaccgagaggggtgagggcctacctaaagcggoccagccggcttcgacctgttc
ccgcaagtgcgccacgatacctgtctgtgtgggagctgcacccagcaaggggaccgtgaacctgacctggctccggcca
gtgggaagcctgtgaaccatctccaggaagagggaggaagcagcgcaatggcaggttaacctgacgtccacctgccgggtg
ggcaccgcgagactggatcagggggagacctaccagtgcaagggtgacccaccccaactgccaggggccctcagggelcca
cgaccaagaccagcgcccgctgtgctgtcccggaagtctatgcgtttgcgacggcgaggtggcgggagccgggacaagc
25 gcacctcgcctgctgatccagaactcagctgagggacatctcgtgtcagtgctgcacaacagaggtgcagctccggagcg
ccggcacagcagcagcagccccgcaagaccaagggtccggctctctgtcttcagccgctggaggtgaccagccgggaat
ggagcagcaaaatgagtgatctcgtccgtgcagtcocatgagcgagcgagccctcacagaccgtccagcgaggggtgtctgtaa
atcccggttaagcggaatcctcgaagctccatctggccattaccttaactcagtaaatggaaattttgtgatgtgctgacct
actgcttggcccaagatgcagagagagaaggaggaatgagagattgagaaagggaagtgtacgacctgtataatcagata

30

2e12-scFv-human IgE Fc (CH2-CH3-CH4)-CD80 (amino acid sequence)

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MDFQVQIFSLLISASVMSRQVDIVLTQSPASLAVSLGQRATISCRASESVEYYVTS
LMQWYQQKPGQPPKLLISAASNVESGVPARFSGSGSGTDFSLNIHPVEEDDIAMFY
CQQSRKVPWTFGGGKLEIKRGGGSGGGSGGGSGVQLKESGPGLVAPSQSL
ITCTVSGFSLTGYGVNWVRQPPGKGLEWLGMIWGDGSTDYNSALKSRLSITKDNS
5 KSQVFLKMNSLQTDRTARYYCARDGYSNFHYVMDYWGQGTSTVTVSSDHVCSR
DFTPTVKILQSSCDGGGHFPPTIQLLCLVSGYTPGTINITWLEDGQVMDVDLSTAS
TTQEGELASTQSELTSQKHWSLDRYTCQVTYQGHITFEDSTKKCADSNPRGVSA
YLSRSPFDLFIKSPITITCLVVDLAPSKGTVNLTVSRASGKPVNHSTRKEEKQRNG
TLTVTSTLPVGTDRDIEGETYQCRVTHPLPRALMRSTTKTSGPRAAPEVYAFATP
10 EWPGRDKRTLACLIQNFMPEDISVQWLHNEVQLPDAHSTTQPRKTKSGGFFVFS
RLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNPGKADPSKLPWAITLISV
NGIFVICCLTYCFAPRCRERRRNERLRRESVRPV

500A2 scFv (nucleotide sequence)

15 atgtgtatatacatcagctccttggcgttttactctcttggaattcagcctcagaaagtacatagtgctgactcagactccagccactc
tctctctaattcctggagaagagtcacaaatgacctgtgaagaccagtcagaatattggcacaatcttacactggatcaccaaaacc
aaaggagggtccaagggtctcatcaagtatgcttcgagctcattctcgggatccctccagattcagtgccagtggttcgaaac
agatttcactctcagcatcaataacctggagcctgatgatatcgaatttattactgtcaacaaagtagaagctggcctgcacgttcg
gtcctcggcaccaggctggagataaaacggggtggcgggtggctcggcgagggtgggtcggcgcgatctcaggtcaa
20 gctgcagcagtcocggttctgaactagggaacctgggacctcagtgaaactgtcctgcaagacttcaggtcatattcacagatc
actatattcttgggtgaaacagaagcctggagaaagcctgcagtcgatagaaatgtttatggtgaaaigtgtgtaacagctaca
atcaaaaattccaggccaaggccacactgactgtagataaaatctctagcacagcctacatggaactcagcagcctgacatctgag
gattctgccatctattactgtgcaagaaggccggtagcgacgggcatgctatggactactggggtcaggggatccaagtaccgt
ctcctctgac

25

500A2 scFv (amino acid sequence)

MLYTSQLLGLLLFWISASRSDIVLTQTPATLSLIPGERVTMTCKTSQNIGTILHWYH
QKPKEAPRALIKYASQSIPIPSRFSGSGSETDFTLSINNLEPDDIGIYYCQQRSWPV
TFGPGTKLEIKRGGGSGGGSGGGSGVQLQSGSELGKPGASVKLSCKTSYGI
30 TDHYSISWVKQKPESLQWIGNVYGGNGGTSYNQKFGQKATLTVDKISSTAYMEL
SSLTSEDSAIYYCARRPVATGHAMDYWGQGIQVTVSSD

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NT

5' oligo:

Name : IgGWT3

GTTGTTTTCGAAGGATCCGCTTTACCCGGAGACAGGGAGAGGCTCTT

5 NT

3' oligo:

Name : hIgGWT5

GTTGTTAGATCTGGAGCCCAATCTTGTGACAAAACCTCACACATG

NT

10 5' oligo:

Name : FADD5

Sequence

GTTGTGGATCCTTCGAACCCGTTCTCGGTGCTGCTGCACTCGGTGTCG

NT

15 3' oligo:

Name : FADD3

Sequence

GTTGTATCGATCTCGAGTTATCAGGACGCTTCGGAGGTAGATGCGTC

NT

20 **FADD-CSSCFV (nucleotide sequence)**

gtggatccttcgaacccgttcctggtgctgctgcactcgggtgctccagccctgctgagcagcgcgcgcgaccgagctcaagttccta
tgctcctgggcgcgtgggcaagcgcgaagctggagcgcgtgagcagcggccttagacctcttccatcgtgctggagcagaacga
cctggagcccgggcacaccgagctcctgcgcgagctgctgcctccctgcgcgcgccagacctgctgcggcgcgtgcgacgact
tcgagggcggggcgggccggggccgcgcctgggggaagaagacctgtgtgcagcatttaacgtcatatgtgataatgtgggg
aaagattggagaaggtgctgctcagctcaaaagtcagacaccaagatcgacagcatcgaggacagatccccgcgaacctg
acagagcgtgtgctgggagtcactgagaatctgggaagaacacagagaaggaacgaacagtgcccacctgtgggggctc
tcaggctcgcagatgaacctgggtgctgacctggtacaagaggtcagcaggcccgtagctccgaacagaggtggggcca
tgtccccgatgcatggaactcagcgcctacccgaagcgtcctgataactcgagatcgataacaac

30 **FADD-CSSCFV (amino acid sequence)**

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5

GTTGTGGATCCTCCCTTTTGGGTGCTGGTGGTGGTTGGTGTCTGGCTTGCTAT
AGCTTG

GTTGTTTCGAACCCAGAAAATAATAAAGGCCACTGTTACTAGCAAGCTATAGC
AAGCCAG

15 GTTGTGGATCCTCCCTTTTGGGGTGCTGGTGGT

GTTGTTTCGAACCCAGAAAATAATAAAGGCCAC

GTTGTGGATCCTCCTGCTCCCATCCTGG

25 GTTGTTTCGAACGGCAAAGCAGTAGGTCAGGC

GTTGTGGATCCTTCGAACCCATTCTGGTGCTGCTGCACTCGCTG

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MFADD3XC (nucleotide sequence)

GTTGTTATCGATCTCGAGTCAGGGTGTTCAGGGAAGACAC

- 5 **Murine FADD nucleotide sequence** (full length, but without flanking -Ig or transmembrane sequences) (**nucleotide sequence**)

gtggatcctcgaacatggaccattcctggtgctgctgcactcgtgtccggcagcctgtcgggcaacgatctgatggagctcaa
gttcttgtccgcgagcgcgtgagcaaacgaaagctggagcgcgtgcagagtggtcctggacgtttcacgggtgctgtggagca
gaacgacctggagcgcgggcacaccgggctgctgcgcgagttgctggcctcgtgcgcgcacacgatctactgcagcgcctgg
10 acgacttcgaggggggacggcgaccgctgcgccccggggaggcagatctgcaggtggcatltgacallgtgtgtgacaatg
tggggagagactggaagactggcccgcgagctgaaggtgtctgagggccaagatggatgggatggaggagaagtaacccccg
aagctctgagtgagcgggtaaggagagctctgaaagctggaagaatgctgagaagaagaacgctcgggtggccggactggtca
aggcgcctgcggacctgcagcgctgaatctgtggtgacctggtggaagaagcccaggaatctgtgagcaagagtgagaatatgt
ccccgactaaggagattcaactgtgtcttctcagaacaccctgactcgagatcgat

15

Murine FADD (amino acid sequence)

VDPSNMDPFLVLLHSLSGSLSGNDLMELKFLCRERVSKRKLERVQSGLDLFTVLL
QNDLERGHTGLLRELLASLRHDLQRLDDFEAGTATAAPPGEADLQVAFDIVCD
NVGRDWKRLARELKVSEAKMDGIEBKYPRLSERVRESLKVWKNAEKKNASVA
20 GLVKALRTRCLNLVADLVEEAQESVSKSENMSPLVRDSTVSSSETP

MCASP3-5 (nucleotide sequence)

GTTGTGGATCCTTCGAACATGGAGAACAAACAAACCTCAGTGGATTCA

- 25 **MCASP3-3 (nucleotide sequence)**

GTTGTTATCGATCTCGAGCTAGTGATAAAAGTACAGTTCCTTCGT

MCASP8-5 (nucleotide sequence)

GTTGTTTCGAACATGGATTTCAGAGTTGTCTTTATGCTATTGCTG

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MCASP8-3 (nucleotide sequence)

GTTGTATCGATCTCGAGTCATTAGGGAGGGAAGAAGAGCTTCTTCCG

5 **hcasp3-5(nucleotide sequence)**

GTTGTGGATCCTTCGAACATGGAGAACACTGAAAACCTCAGTGGAT

hcasp3-3 (nucleotide sequence)

GTTGTATCGATCTCGAGTTAGTGATAAAAATAGAGTTCTTTGTGAG

10

hcasp8-5 (nucleotide sequence)

GTTGTGGATCCTTCGAACATGGACTTCAGCAGAAATCTTTATGAT

hcasp8-3 (nucleotide sequence)

15 GTTGTATCGATGCATGCTCAATCAGAAGGGAAGACAAGTTTTTTCT

1. 2H7 scFv with alternative VHL11 mutations:

Nucleotide sequence

20 Aagcttgccgcacatggatttcaagtcagatgttcagcttcctgctaactcagtcgcttcagtcataattgccagaggacaaaattgtctc
tccagctctccagcaatcctgtctgcatctccaggggagaggtcacaatgacttcagggccagctcaagtgfaagttacatgcac
tggaccagcagaaagccaggtactcccccacccctggatttatgcccatccaactggctctgagtcctctgctcgttcagt
ggcagtggtctgggacctcttactctcacaatcagcagagtgaggctgaagatgctgccacttattactgccagcagtggaagt
tttaaccacccacgttcggtgctgggaccaagctggagctgaagatggcggctgctcggggcgtggtggaatctggaggaggt
25 gggagctctcaggttatctacagcagctctggggtgag (one of the following: tcn, acn, gan, can, aan,
cgn, agn)
gtgagcctggggcctcagtggaagatgtcctgcaaggcttcggctacacattaccagttacaatatgcactgggtaagcagaca
cctagacaggcctgggaatggaatggagctattatccaggaaatggtgatacttctacaatcagaaagtcaaggcgaaggccac
actgactgtagacaaatctccagcacagcctacatgcagctcagcagcctgacatctgaagactctggctctattctgtgcaag
30 agtgggtgactatagtaacttactgggtacttgatgtctggggcacagggaccacggtcaccgtctctctgatcg

Amino acid sequence

25 MDFQVQIFSLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QKQPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
ENPTFGAGTKLELKDGGGSGGGSGGGSSQAYLQQSGAE (one of the following:
35 S, T, D, E, Q, N, R, K, H)
VRPGASVKMSCKASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFK

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GKATLTVDKSSSTAYMQLSSLTSEDSAVYFCARVVYYNSNYWYFDVWGTGTTVT
 VSSDQ

2. VHL11 deletion

5 Nucleotide sequence:

Aagcttgcgccatggatttcaagtgacagatttcagcttctgctaatacagtgcttcagtcataattgcagagagacaatgtgtctc
 tccagcttccagcaatcctgtctgcatctccaggaggagaaggtcacaatgacttgcagggccagctcaaggtgaagtacatgcac
 tggctaccagcagaagccaggatctcccccacccctggattatgcccatcccaactgccttcaggatccctgctcctcagtgct
 ggcagtggtgtctggaccctctactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccacagtgaggat
 10 tttaaccaccacgtctgtgtctgggagcaagctggagctgaagatggcgggtgctcggcggtgtgtgagctatgcaggaggt
 gggagctctcaggcttatctacagcagctctggggctgagggtgagcctcgggcctcagtgaaagtgtcctgcaaggctctgct
 acacattaccagttacaatgatcactgggtaaacgacacacctagacagggcctggaatggattgagctattatccaggaaatg
 gtgatacttccataacacagaagttcaagggcaaggccacactgactgtagacaatctctcagcacagcctacatgcagctcagc
 agcctgacatctgaagactctgcgtctatttctgtgcaagagtggtgtactatagtaactcttactgtgacttctgatgtctggggcaca
 15 gggaccacgggtcactgtctctctgatcag

Amino acid sequence:

MDFQVQIFSFLLISASVHARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 QQKPGSSPKPWYAPSNLASGVPARFSGSGSSTSYSLTISRVEADAATYYCQQWS
 20 FNPTTFGAGTKLELKDGGSGGGSGGGSGQAYLQSGAEVRPGASVGMKSCA
 SGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSST
 AYMQLSSLTSEDSAVYFCARVVYYNSNYWYFDVWGTGTTVTVSSDQ

3. 2H7 VL L106 with alternative mutations

25 Nucleotide sequence:

aagcttgcgccatggatttcaagtgacagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaatgtgtctct
 cccagcttccagcaatcctgtctgcatctccaggaggagaaggtcacaatgacttgcagggccagctcaaggtgaagtacatgcact
 ggtacacagcagaagccaggatctcccccacccctggallatgcccataccaactcgtcttcaggatccctgctcgtctcactg
 gcaatgggtctgggacctctactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccagcagtgagtt
 30 taaccacccacgttctggtctgggaccaagctggag (tcn, agn, aan, cgn, can, gan, and non-natural
 derivatives of these codons) aaagatggcggtgctcggcggtgtggtatctggaggaggtggagctc

Amino acid sequence:

MDFQVQIFSFLLISASVHARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
 35 QQKPGSSPKPWYAPSNLASGVPARFSGSGSSTSYSLTISRVEADAATYYCQQWS
 FNPTTFGAGTKLE (S, T, R, K, H, Q, N, D, E, and non-natural derivatives of these
 amino acids at position 106)KDGGSGGGSGGGSS

4. VL L106 deletion

40 Nucleotide sequence:

Aagcttgcgccatggatttcaagtgacagatttcagcttctgctaatacagtgcttcagtcataattgccagaggacaatgtgtctc
 tccagcttccagcaatcctgtctgcatctccaggaggagaaggtcacaatgacttgcagggccagctcaaggtgaagtacatgcac
 tggctaccagcagaagccaggatctcccccacccctggallatgcccataccaactcgtcttcaggatccctgctcgtctcactg
 ggcagtggtgtctgggacctctactctctcacaatcagcagagtgagggtgaagatgctgccacttattactgccacagtgaggt
 45 tttaaccacccacgttctggtctgtggaccaagctggagaaagatggcgggtgctcggcggtgtgtggtatctggaggaggtgg
 gactc

Amino acid sequence:

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PCT/US2003/041600

MDFQVQITFSLILISAVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QOKPGSPKPWYAPSNLASGVPARFSGSGGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLEKDDGGSGGGSGGGGGSS

5. **IgE CH3 CH4**

Nucleotide sequence:

10 tccaccgcagaggggtgagcgctacctaagccgcccagcccgctcgaacctgttcacccgaagtcgcccagatcacctgtc
tgggtgtgacctgtgaccaccagcaaggcgaccgtgaacctgacctgtgccggccagtgaggaaacctgtgaacctccacc
agaaaggagggagagcagcgcaatggcacgttaaccgtcacgtccacctcgccgtggggaccaccgagactggatcgaagggg
15 agacctaccagtgacgggtgaccacccaccacgtgccacgggcccctcatgcggttcacgaccagacagcggcccgcgtgct
gccccggaagtctatcgtgttcgacgcccggagtgggcggggagccgggacagcagccaccctcgctgcctgatccagaactt
catgacctgaggacatctcgttcagtggtcgcacacaaggggtgcagctccggagcccccggcacagcagcagcagccccc
aagacaaagggtccggctcttcgtcttcagccgcttgagggtgaccagggccgaatggggagcagaagaatgagttcatctgcgc
gtgcagttccatgagcgagcgagcccccctcacagaccttcacagcgaagcggtgtctgtaaatcccggttaatgataatctagaa

Amino acid sequence:

20 SNPRGVSA YLSRPSFDFLIRKSPITITCLVVDLAPSKGTVNLWTSRASGKPVNHSTR
KEEKQRNGTLTVSTLPVGTTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAA
PEVYAFATPEWPGSRDKRTLACLQNFMPEDISVQWLHNEVQLPDARHSTTPQRK
TKSGGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSNPNKG

6. **hIgG1H/IgE WCH3 WCH4**

Nucleotide sequence:

25 tgaatcaggagcccaatctcttgacaaaactcacacatcccaccgctcccagcatccaaccgagaggggtgagcgccatccta
agccggcccagcccgcttgacctgttcacccgaaagtcgcccacgatcacctgtctgtgtggtgacctggcaccaccgaagggt
acctgtgaacctgacctgtgtccggggcagtgagggaagcctgtgaaccactccaccagaaaggagaggaagcagcgcaatggca
cgttaacctcagctcagctccacctccgggtggcaccggagactgagtgagggggagactaccagtgcagggtgacctcacc
30 cactccccaaggccctcatgcggtccacgaccaagaccagcgcccccgtgctgcctccggaaagtcatgcgttggcagcgc
ggagtggcggggagagccgggacaagcgcaacctcgctgcctgatccagaactcatgctgaggagacatctcgttcagtggt
gcacaacgaggtgcagctccggagccggcgacagcagcagcagcccgcaagaccagggtccggctctctgtcttca
gcgccttgagggtgaccagggccgaatgggagcagaagaatgagttcatctgccgtgcagttccatgagcgagcagcgccctca
cagacctgcagcgagcgtgtctgtaaatcccggttaatgataatctagaa

Amino acid sequence:

35 DQEPKSSDKTHTSPSPASNPGRVSA YLSRPSFDFLIRKSPITITCLVVDLAPSKGTV
NLWTSRASGKPVNHSTRKEEKQRNGTLTVSTLPVGTTRDWIEGETYQCRVTHPHL
PRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLQNFMPEDISVQWLH
NEVQLPDARHSTTPQRKTKSGGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQ
40 TVQRAVSVNPNKG

7. **IgE WCH2 WCH3 WCH4**

Nucleotide sequence:

Tgatcactgtctccagggacttcaccccgccaccgtgaagattctacgtctcctgcagcggcggggacatctcccccg
accactcagctcctgtgctcgtctgtgggtacacccacgggactatcaatcacctcgtgctgaggagcggcgaggtcatggacg
45 tgcactgttcacacgcctctaccacagcaggaggtgagctggcctccacaaaagcgagctcaccctcagcagaagcactggc
tgtcagacccgacctacacctgccaggtcacctatcaagctgcacactttgaggacagcaccagaagtgtagcagattcaaccc
gagaggggtgagcgccacttaataagccggccagcccgttcacctgttaccatccgaagtcgccaccagatcacctgtctgtgtgtg
gacctggcacccagaaggggacctggaacctgacctgtgcccggccagctgggaagcctgtgaaccaatccaccagaaagg
50 aggaggaagcagcgcaatggcactgaacgtcagctccacctgocggtggggaccaccgagactggatcagggggagacctta
ccaagtgaagggtgaccacacccacctgcacagggccctcatgcgtgcacagaccagaccagggcccccgtgctgctggccc
gaaagtcatgcgttgcgacgcccggagtgcccggggagcggcgacaagcgacacctgcctgcctgatccagaactatgcct

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gaggacatctcgggtgcagctgctgcacaacgaggtgcagctccccggagcccgccgacagcagcagcgagccccgcaagacc
aagggtccctcggtctctctcagccgctggagtgaccaggccgaatgggagcagaagaatgagttcatctgccgtgcag
tccatgagcagcgagccctcacagaccgtccagcggagcgtgtctgtaaatcccggtgtaaatgataatctaga

- 5 Amino acid sequence:
DHVCSRDFTPPTVKILQSSCDGGGHPPTIQLLCLVSGYTPGTINTWLEDGQVMDV
DLSTASTTQEGELASTQSELTLQKHWSLDRTYTCQVITYQGHTEFEDSTKKCADSN
PRGVSAYLSRSPFDLFIRKSPITITCLVVDLAPSKGTVNLTSRASGKPVNHSRKE
EKQRNGTLTVTSTLPVGTTRDWIEGETYQCRVTHPHLPRALMRSTTKTSGPRAAPE
10 VYAFATPEWPGSRDKRTLACLQNFMPEDISVQWLHNEVQLPDARHSTTQPRKTK
GSGFFVFSRLEVTRAWEWEQKDEFICRAVHEAASPSQTVQRAVSVNPGK

8. hIgG1H/IgE CH3 CH4 (ORF)

Nucleotide sequence:

- 15 tgatcaggagcccaaatctctgcacaaactcacacatccccaccgtccccagcatccaacccgagaggggtgagcgccaccta
agccggccagcccgcttcgactgtttcatccgcaagtcgcccagatcacctgtctgggtggtgacctggccaccagcaagggg
accgtgaacctgacctgtccctccggccagctgggaagcctgtgaaacactccacacgaaggagggagaagcagcgcaatggcga
cgttaaccgtcacgtccacacctgcgggtggcgaccggagactgcatcgagggggagacctaccagtgaggggtgacccacccc
cactctgcccagggccctatgcgggtccagaccaagaccagcgcccggtgctgccccgggaagtctatgcgtttgcagcgc
20 gggagtggccggggagccgggacaagcgacacctgcctgctgatccagaactctcatggagacatctcggtgcagtggtct
gcacaacgaggtgcagctccccgacgcccggccacagcagcagcagcagcccccgaagcaaggggtccggctctctcgtcttca
cgccgctgcaggtgacaggggccgaatgggagcagaagaatgagttcatctgcccgtgcagttcatgagggcagcgagccctca
cagaccgtcacggagcgggtgtctgtaaatccgggtaaagggtacctctgga

- 25 Amino acid sequence:
DQEPKSSDKTHTSPSPASNPRGVSAYLSRSPFDLFIRKSPITITCLVVDLAPSKGTV
NLTWSRASGKPVNHSRKEEKQRNGTLTVTSTLPVGTTRDWIEGETYQCRVTHPHL
PRALMRSTTKTSGPRAAPEVYAFATPEWPGSRDKRTLACLQNFMPEDISVQWLH
NEVQLPDARHSTTQPRKTKSGGFFVFSRLEVTRAWEWEQKDEFICRAVHEAASPSQT
30 VQRAVSVNPGKSGSFE

9. 2H7 VHL11S scFv hlgG1(SSS-S)H hlgE WCH3 WCH4

Nucleotide sequence:

- aagcttgccgccatgatttcaagtcagatttcagcttctgtaatacagtgcttcatgataaattgccagaggacaaattgttctct
35 cccagctcccaacaaatctgtctgcatctccaggaggagaaggtcacaaatgactgcaggccagctcaagtgtaagttaacatgcaat
ggtaaccagcagaagcaggaatctcccccaaaccttgattatgccccatcaaacctggctcttgaggatccctgctgcttcagtg
gcagtggtctgtgggaccttctaattctctcacaatcagcagagtgaggctgaagatgctgccattattactgccagcagtggaatt
taaccacccacggttcgggtgctggaccagaagctggagctgaaagatggcgggtggctcgggcggtgtggatctggaggaggtg
ggagctctcagggattatcacagcagctctggtggctgagtcggaggcctggggcctcagtgaaagtgtctcgaaggctcttgcc
40 tacacatttaccagttacaattatgcactgggtaaagcagacacatagacaggccctgggaatggattggagctattatccaggaat
gggtataattctcacaatcagaatttcaaggccaaaggccacactgactgtagacaaatctccagcagagcctacatgcagctcag
cagcctgacatctgaagactctgctggtctattctgtcgaagagtggtgactactatgtaactcttactgtaactctgctgtgggcac
agggaccacggctcagcgtctctctgtacagagcccaaatctctgcacaaactcacacatcccaacgctctcagcatccaac
cggagagctgtgagcgctactaaaggccgcccagcccggttcgactgttcatccgcaagtcgcccacacactcgtctgtgtgt
45 ggaactgggacccagcagaaggagaccgtgaacctgacctgtgccgggccaagtgggagcctgtgaacctcaccacagcaaga
gaggagagacgcagcagtgacgtttaaacgtcacgtccacacctggcggtgggaccccgagactggtatcgaggggagacct
accagtgcagggtgagccaccccaacctgccagggccctcatcggttcacagaccagcagcagcgccggcgctgctgctgccc
ggaaagtctatgctttggagcagccggagtgccggggagccgggacagcagccctgctgctgctgacacgaacttactgccc
tgaagacatctcgtggtcagtggtgcacaacgaggtgcagctccccggagcggcgacacagcagcagcagcagcccgcaagacc
50 aagggtccggctctctgtctcagccgctggagtgaccagggccgaatgggagcagaagaatgagttcatctgcccgtgcag
tccatgaggcagcagccctcacagaccgtccagcagcgtgtctgtaaatccgggtgtaaatgataatctaga

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Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGKEVTMTCRASSVSVMHWY
QKPKGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
5 FNPPTFGAGTKLELDKGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGNDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWYFDVWGTGTTVTYSSDQEPKSSDK
10 THTSPSSASNPRGVSAIYLRSPSPFDLFIKSPITCLVVDLAPSKGT/VNLTWSRSG
KPVNHSTRKEEKQRNGTLTVTSTLPVGTDRWIEGETYQCRVTHPHLPRALMRSTT
KTSGPRAAPEVYAFATPEWPGSRDKRTLACLQNFMPEDISVQWLHNEVQLPDAR
HSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNP
GK

10. 2H7 VHL11S scFv hIgG1(SSS-PH hIgE WCH3 WCH4

Nucleotide sequence:

aagcttgccgccatggatttcagtgacagatttcagcttctgctaatacagtgcttcagtcataaattgccaggacaaattgtctct
cccagctccagcaatctctgctgcatctccaggaggagaggtcacaatgacttcgagggccagctcaagtgtaagtacatgcact
5 ggtaaccagcagaagccagagctctcccccaaacctcgattatgcccaatccaaactggcttcggagtcctctgctgcttcagtg
cagctggctctggagacccttactctctcacaatcagcagaagtgaggctgaagatgctgccaacttactgccaagcagtggaatt
20 taaccaccacccagcttcggtgctgggaccagctgagctgaagatggcggctgctcggcggctgctggatctggagagggg
ggagctctcaggcttatctacagcagctcgggctgagtcgggagcctgggagcctcagtggaatgctctcgaaggctcttgcc
tacacattaccagttacaatgatcactgggttaagcagacacctagacaggggcctggagtgattgagctattatccaggaaat
gggtgactcttcacatacagaagttcaaggcccaaggccacactgactgtagacaaatctccagcagacgctacatgcagctcag
25 cagcctgcacatctgaagactctgctgctattcttgtcagaagtgctgtactatagtaactcttaactggtactgctatgctgggac
aggagacacagctgcaactctctctctgatcaggagcccaaatcttgacaaaactcacacatcccaactgctcccaagctcaaac
cgaagggggctgagccgctacctaagccggccagcccgcttcgactgttaccgcaagctgcccacagatcacctgtctgtggt
ggactctggcaccagcgaaggggaccgtgaactgacctggctccgggccaagtgaggagcctgtgaaccatccacagcaagaag
30 gaggaggaagcagcgaatggcacgttaaccgtcagctccacctgcccgttgggaccccgagactggatcaggggagacat
accagtgagggtgagcccaaccacccactgccaggggccctcatgctggctccagaccaaagcagcggcccgctgctgctcc
ggagctctatgctgttgcgacggccggagtgccggggagccgggacaaagcgccacctgctgctgactccagaacttcatgcc
tgaaggacatctcgggtcagtgctgcacacagggtgcagctccggagcggccgacacagcagcagcagcggccgcaagacc
aaggctctccgcttctctgtcttcagccgctggaggtgaccagggccgaatgggagcagaagaatgattgattcctgctgacg
35 tccatgagcagcagagccctcacagaccgtcagcagcgggtgctgttaataccggtaaatgataactaga

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILSASPGKEVTMTCRASSVSVMHWY
QKPKGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
5 FNPPTFGAGTKLELDKGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGNDTSYNQKFKGKATLTVDKSSS
40 TAYMQLSSLTSEDSAVYFCARVYYNSYWYFDVWGTGTTVTYSSDQEPKSSDK
THTSPSPASNPRGVSAIYLRSPSPFDLFIKSPITCLVVDLAPSKGT/VNLTWSRSG
KPVNHSTRKEEKQRNGTLTVTSTLPVGTDRWIEGETYQCRVTHPHLPRALMRSTT
KTSGPRAAPEVYAFATPEWPGSRDKRTLACLQNFMPEDISVQWLHNEVQLPDAR
50 HSTTQPRKTKGSGFFVFSRLEVTRAWEQKDEFICRAVHEAASPSQTVQRAVSVNP
GK

10. 2H7 VL L106S

aagcttgccgccatggatttcagtgacagatttcagcttctgctaatacagtgcttcagtcataaattgccaggacaaattgtctct
cccagctccagcaatctctgctgcatctccaggaggagaggtcacaatgacttcgagggccagctcaagtgtaagtacatgcact
5 ggtaaccagcagaagccagagctctcccccaaacctcgattatgcccaatccaaactggcttcggagctcctgctccttcagtg

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gcagctgggctctgggacaccttactctctcacaatcagcagagtgaggctgaagatgctgccatttactgcccagcagtgaggatt
taacccaccacagcttgcgtgctggaccaagctggagctgaagatggcggctgctcggcggtggtgagctggaggaggtg
ggagctc

5 Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QKQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSYLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGGSGGGSGGGSS

10 11. 2H7 VL L106S scFv

Nucleotide sequence:

aagcttgccgccatggaatttcaagtgcagattttcagcttctgtaatacagtgcttcagtcataatgccagaggacaattgttctc
ccagctctccagcaatctctgctcatctccaggggagaggtcacaatgactgcaggggcagctcaagtgtaagtacatgcact
ggtaccagcagaagccagatcctccccaacccctggattatgcccatccaactggtctcggagctccctgctcgttcagtg
15 gcaatgggtctgggacaccttactctctcacaatcagcagagtgaggctgaagatgctgccatttactgcccagcagtggaatt
taacccaccacagcttgcgtgctggaccaagctggagcttaaaatggcggctggctcggcggtggtgagctggaggaggtg
ggagctctcaggcttatctacagctctgggctgagctggtgaggcctggggcctcagtggaagatgctcgaaggctctggc
tacacatttaccagttacaatgactcagtggaagaagcagacactagacaggccctggaatggatggagctattatccaggaaat
ggtgatactctcacaatcagaagttcaaggccaagggccacactgactgtagacaatctccagcagacgctacatgcagctcag
20 cagctgacatctgaagactctgcggtctatctgtgcaagagtggtgactatagtaacttactgtaactctcatgctctggggcac
agggaccacagctcaccgtctctctgacag

Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
25 QKQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSYLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGGSGGGSGGGSSQAYLQQSGAELVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWFYD VWGTGTTVTVSSDQ

30 12. 2H7 scFv VL L106S VHL11S scFv

Nucleotide sequence:

Aagcttgccgccatggaatttcaagtgcagattttcagcttctgtaatacagtgcttcagtcataatgccagaggacaattgttctc
tccagctctccagcaatctctgctcatctccaggggagaggtcacaatgactgcaggggcagctcaagtgtaagtacatgcac
tggtaaccagcagaagccaggtatcctccccaacccctggattatgcccatccaactggctctcggagctcctgctcgttcagt
35 ggcagtggtctgggacaccttactctctcacaatcagcagagtgaggctgaagatgctgccatttactgccagcagtggaat
tttaacccaccacagcttgcgtgctggaccaagctggagcttaaaatggcggctcggcggtggtgagctggaggaggt
ggagctctcaggcttatctacagcagctgggctgagctggtgaggcctggggcctcagtggaagatgctcgaaggctctg
gctacacatttaccagttacaatgactcagtggaagaagcagacactagacaggccctggaatggatggagctattatccaggaa
atggtgatactctcacaatcagaagttcaaggcgaaagccacactgactgtagacaatctccagcagacgctacatgcagctc
40 agcagctgacatctgaagactctgcggtctatctgtgcaagagtggtgactatagtaacttactgtaactctcatgctctggggc
acagggaccacagctcaccgtctctctgacag

Amino acid sequence:

MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
45 QKQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSYLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLESKDGGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSYWFYD VWGTGTTVTVSSDQ

50 10. Human IgD hinge linker with attached restriction sites

Nucleotide:

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gtggatccagggttcgaagcttccaagggcagggcctctccgtgccactgcacaaccccgaagcagagggcgagcctgccaa
ggcaaccacagccccagccaccctgtaacacaggaagagagagaagaagaagaagagagaagagaagaagagaga
caagaagagagagagacaagaagccggctgcatgctgacg

- 5 Amino acid:
VDPGSKSPKAQASSVPTAQPQAEGLAKATTAPATTRNTGRGGEEKKKEKEKEEQ
EERETKTGAVD

Sequence of Native IgD hinge domain:

- 10 (includes a cysteine residue—we truncated the hinge prior to that residue for these
constructs:)

Nucleotide:

- gagttctcaagggcagggcctctctccgtgccactgcacaacccccgaagcagagggcgagcctgccaaaggcaaccacagccc
cagccaccacccgtaacacaggaagagggagagagagaagaagaaggaaggaaggaaggaacagaagagagagaga
15 gacaagaacaccagaggtgtccgagccacaccagcctcttggcgtctacctgtaacacct

Amino acid sequence:

ESPKAQASSVPTAQPQAEGLAKATTAPATTRNTGRGGEEKKKEKEKEEQEERET
KTPECPHSHTQLPGVYLTP

- 20

12. 2H7 VH L11S

Nucleotide sequence:

- gaggcttatctacagcagctctggggctgagtcggtagggcctggggcctcagtgaaagatctctgcaaggctcttgctcacacattt
accagttacaattatgcacatgggtaagcagacacactagacagggcctggaatggattggagctattatccaggaaatgggtgatact
25 tctacaatcagaaagtccaaggcgaaggccacactgactgtagacaatatctccagcacagcctacatgcagctcagcagcctga
catctgaaagactctgggctctattctgtgcaagagtggtgtactatagtaactcttactggtaactgatgtctggggcacagggacc
aaggctcaccgtctctct

Amino acid sequence:

- 30 QAYLQQSGAESVRPGASVKMSCKASGYTFTSYNMHWVKQTPRQGLEWIGATYPG
NGDTSYNQKFKGKAILTVDKSSSTAYMQLSSLTSEDSAVYFCARVYVYSNSYWY
FDVWGTGTTVTVSS

13. 2H7 VH L11S scFv

- 35 Nucleotide sequence:

- aagcttgcgcgaatgatttcaagtcagatfttcagcttctgctaatacagtgcttcagtcataatgccagaggacaaattgtctct
cccagttccagcaatcctgtctgcatctccaggggaagaggtcacaatgacttcagggccagctcaagtgtaagttacatgcact
ggttacacagcagaagccaggaatcctcccccaaccctggattatgccccatcaaacctggtctctggagtgccctgtcgtctcagtg
gcagtggtgctgggacctcttactctctacatacagcagaagtgaggagctgaagatgctgccacttatctccagcagcagtggaatt
40 taaccacaccaggttcgggtgctgggaccaagctggagctgaaagatggcgggtgctcggcggtgtggtgctgagtgagagaggtg
ggagctctcaggttatctacagcagctctgggctgagtcggtagggcctggggcctcagtgaaagatgtctcgaaggcttctggc
tacctatccaggttacaattgcactgggtaagcagacacctagacaggcctggaatgattggagctattatccaggaaat
ggtgatattctctacaatcagaagtcgaaggcgaaggccacactgactgtagacaaatcctccagcagcagctcatatgcagctcag
cagctcagcactggaagactctgggctctattctgtgcaagagtggtgtactatagtaactcttactgtgtaacttgatgtctggggcac
45 agggaccacggctcaccgtctctctgacag

Amino acid sequence:

- MDFQVQLFSLISASVHARGQIVLSQSPAILSASPGKEVTMTCRASSVSVMHWY
50 QQKPGSSPKPWYAPSNLASGVPARFSGSGSTSYSLTISRVEAEDAATYYCQQWS
FNPPITFGAGTKLELKDGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK

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PCT/US2003/041600

ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSNSYWFYFDVWGTGTTVTVSSDQ

14. 2H7 scFv VH L1S hlgG1 (CSC-S)H WCH2 WCH3

Nucleotide sequence:
5 aagcttgcgccatggaatttcaagtcagattttcagcttctgctaatacagtgcttcagtcataaattgccaggagacaattgttctct
cccagctccagcaatcctgtctgcatctccaggaggagaaggtcacaatgacttgcaggccagctcaagtttaagttaactgact
ggtaccagcagaagccaggatcctcccccnaacctggattatgccccatcaacctggcttcttgagtcctgtctcgttcagtg
gcagtggtgtctggacctctactctctacacatcagcagagtgagggtggaagtgcgtccacttattactgccagcagtggaattt
10 taaccaccacgtgtcgtgtcggaccagaagctggagctgaaagatggcgtgtcctcggcggtgtgtggaictggaggaggtg
ggagctctcaggcttatctacagcagctctggggtgagctgtgaggcctggcgccagtgaaatgtcctcgaaggcttctggtc
acacatttaccagttacaatattgactgggtaaagcagacacctagacagggcctggaatggattgagctatttaccaggaatg
gtgatacttctcaatcagaagttcaaggcgaagccacactgactgtagacaaatcctccagcacagcctactgcagctcagc
agcctgacatctggaagactctcggctatttctgtgcaagagtggtgtactatgtaactcttactgttactctgaatcttgaggcaca
15 gggaaccaggctcaccgtctctctgactcaggagccaaatctgtgacaaactcacaatctccacgtgtcagcaccctgaactc
ctgggtggagcgtcagcttctctctcccccnaaaccaaggacacacctatgactcggagccctgaggtgcacatgctgtgtg
gggtggcgtgagccagcagacacctgaggtcaactgtgacgtgacgcgglggaggtgcataatgccagacaagaagc
cggggggaggagcagtcacacagcagctaccgtgtgttcagcgtctcaccgtcctgcaccagagactggctgaatggcaaggag
20 tacaagtgcaaggtctccacaagaagccctccagccccatcgagaanaacatctccaaagccaaaggcagccccgaancc
taacgtgtacacgtgccccctcccggtgagctgaccaaagaacagcagtcagctgacctgcctgtcacaagctctatcca
agcgaacatgccgtggaatgggagagcaatgggcagccggagaacaactacaagacacgcctcccgctgtcggactccgacg
gtctcttctctctacagaagctcaccgtggacaaagcaggtggcagcaggggaacgtcttctatctcctgtgatcatgag
gctgtcacaacactacacaggaaggcctctcctgtctccgggtgaatgatctaga

Amino acid sequence:
25 MDFQVQIFSLISASVUIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QKQPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQWS
FNPTTFGAGTKLELKGDDGGSGGGSGGGSSQAYLQQSGAESVRPAGASVKMSCK
30 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSNSYWFYFDVWGTGTTVTVSSDQEPKSCDK
THTSPPCSAPBLLGGPSVFLFPPKPKDITLMISRTPEVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKLGFPYSDIAVWEWSNGQPE
35 NNYKTTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSL
SPGK

15. 2H7 scFv VH L1S IgE WCH2 WCH3 WCH4

Nucleotide sequence:
40 aagcttgcgccatggaatttcaagtcagattttcagcttctgctaatacagtgcttcagtcataaattgccaggagacaattgttctct
cccagctccagcaatcctgtctgcatctccaggaggagaaggtcacaatgacttgcaggccagctcaagtgtaagttaactgact
ggtaccagcagaagccaggatcctcccccnaacctggattatgccccatcaacctggcttcttgagtcctgtctcgttcagtg
gcagtggtgtctggacctctactctctacacatcagcagagtgagggtggaagtgcgtccacttattactgccagcagtggaattt
10 taaccaccacgttctgggtcgtggaccagaagctggagctgaaagatggcgtgtcctcggcggtgtgtggaictggaggaggtg
ggagctctcaggcttatctacagcagctctggggtgagctgtgaggcctggcgccagtgaaatgtcctcgaaggcttctggtc
acacatttaccagttacaatattgactgggtgaagcagacacctagacagggctggaatggattgagctatttaccaggaatg
45 gtgatacttctcaatcagaagttcaaggcgaagccacactgactgtagacaaatcctccagcacagcctactgcagctcagc
agcctgacatctgaagactctcgggtctatttctgtgcaagagtggtgtactatagtaactcttactgtactctgactgtcggcaca
gggacacaggttcaccgtctctcttgatcagctctgtctccagggtactcccccggccacccgtggaatgacttctcgtcgtcgcac
ggcggggggcacttcccccgaccatcagctcctgtgctcctgtctgtgtgtgtacacccagggactatcaacatcactcgtgtg
50 aggacgggcaaggtcatgagctggactgtgtcaccgctctaccagcgaaggaggtgagctggcctccacaagaagcgaagctc
acctcagcagaagcacttgctgtcagaccgacactacacactgccaggtcactatcaaggtcacaactttgaggacagacca

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PT/US2003/041600

agaagtgctgacgattcaacccgagaggggctgagcgctactaaagccggcccaagcccgctgacgtgtcatccgcaagctgc
ccacgatacactgtctgtgtgacctggcaccagcaaggggaccgtgaacctgacctgtgtcccgccagctgtggagacgt
gtgaacacacacacaggaagggaggaagcagcgcaatggcagctgaaccgtacagctgcacactgtccggtgggcaaccgag
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cagcgcccccgtgctgccccgaagctctatgctgttgacgacccgagtgctgggggagccggcgaacagcgaacctgcc
tgctgtgacagaaacttactgctgaggaacatctgtgctcagtggtgctgcacaacgaggtgcagctccggagcccgccgacag
acgacgcagcccccgaagacacagggctccgctctctgcttgcacgccctgagagtgaccagggccgaatgggagcagaa
agatgagttcatctgcccgtcagtcacatgagcgacgagccccacagaccgtccagcgagcggctgtctgtaaatcccgctaaa
tgataatctaga

10 Amino acid sequence:
MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPTTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
15 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSDSASVYFCARVYYNSNYWYFDVWGTGTTVTVDHVCSDFT
PPTYKTLQSSCDGGGHFFPTIQLLCLVSGYTPGTINITWLEDGGVMDVLSATSTQ
EGELASTQSELILSQKHWSLDRITYTCQVITYQGHTFEDSTKKCADSNPRGVSAYLS
RPSFDFLRKSPITLCLVVDLAPSKGTVNLWTSRASGKPNVHSTRKEEQRNRLTL
20 VISTLPVGTDRWIEGETYQCRVTHPLPRALMRSTTKTSGPRAAPEVIAATPEW
PGSRDKRTLACLQNFMPEDISVQWLHNEVQLPDARHSTTPRKTKGSGFFVFSRL
EVTRAWEWQKDEFICRAVHEAASPSQTVQRAVSVPNGK

16. 2H7 scFv VH L11S mlgE WCH2 WCH3 WCH4

25 Nucleotide sequence:
aagcttgcggccatgagatttcaagtgacagatttcaagcttctgctaatcagtgcttcagtcataatgtccagaggacaattgtctct
cccagcttccagcaactctgtctgacttccaggggagaaagtcacaaactgacttgcaggccagctcaagtgtaagttacatgcact
ggtagcagcagaagccagacgtctcccccaaccctggalltatgcccacacacacactggctgtgaggtccctgtcgtctcagtg
30 gcagtgggtctgggaccttactctctcacaatcagcagngtgtaggctgaagatgctgccacttattacgacagctggagattt
taaccacccacagcttctgtctgggacaaagctggagctgaagatggcgggtgctcggcggtggtggatctggaggggtg
ggagctctcagcgttattcagcagcagcttggggctgagctgtgagggcctgggacctgaggaatgctctcgaaggcttctggct
acacattaccagttacaatgatcactgggtaaacgacacactagacaggcgctggaatggatggagctattatccaggaatg
gtgatacttctacaatcagaagttcaaggcgaagccacactgactgtagacaatactccacagcagcctacatgcagctcagc
40 agcctgacatctgaagactctggctctatttctgtcgaagagtggtgtactatagtaactcttactgctacitcgaatctgctgggca
gggacacaggtgacctctcttctgacacgttcgacctgtcaacatactgagccaccctggagctactcattactctctgcgacc
ccaatgcattcactccacacacacagctgactgtcttattatggccacatctaaatgatgtctctctgacgtgctgaatgacgac
gggagataactgatacactgcacaaactgttctaatcaaggaggaaggcnaactagcctctacctcagtaaacctacaactcag
50 agcagcaatggatgtctgaaagacaccttcacctgcaagggtcacctcccaaggcgtagactatttggcccaacacitgggagatgccca
gaatcagggcacgggtgtgattactactctgatccaccacagccccctggacctgtataaaacgggtgctcccaagcttactgt
ctgtggtggactgtgaagagcagaagaatgtcaatgtgacgtggaaaccaaagaaagagactcagctcagactacccagatccca
acactaagcaccacataaacgccacaactagtatcaccttcaactctgcctgtatgttggccaaggactgattgaaggctacgctatc
60 agtgcatagtggaccacccctgalltccaagccattgtgctgtccatcacaagccccagggcagcgctcagccccgaggtat
tatgtgtccaccacacagagggagagagagcaggacaaacgcacactacgtgttgatcagaactcttccctgaggatattct
gtgcagtggctggggatggcaactgatctcaaacagccaacagataccacaacacccctgaatccaatgtctccaatcaa
45 ggtcttcttacttctcagtcgctgtaggtgcgaagacactctggacacagaaaacagttacactgccaaatgtagtccatgagc
actcagaataccaggaactggagaaaacaatatcacagaagcctgtgtaacacccctccctgcctcatctagatctagaag

Amino acid sequence:
MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
50 QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPTTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK

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5

10

[illegible]

35

MDFFQVQIFSLFLLISASVTIARGQVTLVSQSPAILSASPGKEVMTMTCRASSSVSYMIHWY
QKQKGPSSPKWYIAPNSLNASVPAFRRSGSGSSGSSYLSLTISRVAEADAATYYCQQWS
NPNPTFGAGTKLELDGGSGGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
ASGYTITSYNMHWKQTPRQGLEWIGAIYPNGNDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAYVFCFARVYYSNSWYFDWGTGTITVTVSSDQVPVSPPT
PSPSTPTPSPSCCHPRI.SLHRPALEDLLGSEALTCTLTGLRDASGVTITWPSGG
KSAVQGGPDRDLCCGYSSVSLVPGCAEPPNHNGKTFCTTAAYPESKTLPTLATSLS
GNTFRPEVHLLPPSEALINALNELVTLTLARGFSPKDVLRVWLQSGQLPEPREKYL
WASQREPQSGGTTTFAVTSILRVAEEDWKKGDIFSCMGHEALPFTQKTIDRLA
GKPTHYNSQVMAEVD

45

[illegible]

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acacattaccaggttacaataatgactgggtaagcagacacctagacaggcgctggaatggatggagctatttaccaggaaatg
gtgatctctctacaatcagaaggtcaaaggcagccacactgactgtagacaaatctccagcacagcctatcagcagctcagc
agcctgacatctgaagactctgggtctatttctgtgcaaggtggtgtactatagtaactcttactgttacttcgatgtctggggcaca
gggaccacgggtcaccgtctctctgatcacatctgtctctctactactctctcaccctctgcccagccagcctgtcactgca
5 cggccagcgtcttgaggcagctgctctgggttcagatgccagcatcacatgtactctgaatggcctgagagatcctgagggagctg
tcttcacctgggagccctcactgggaaggatgcagtcgagaagaagctgtgcagaatctcctggcgtctacagtggttccagc
gtctgcctggctgtgctgagcgtggaacagtggtggcgtcattcaaggtgcacagtaccatctctgagctgacaccttaactggc
acaaftgccaaagtacagtgaaacaccttccaccocccaggtccacctgtaccggcgtcggaggagctggccctgaatgag
ctcgtgctcctgacatgctgggtgcgagctttcaacctaaaagaagtgtgctggcgatggcgtgcaatggaaatgaggagctgtccc
10 agaaagctacctagtgttgtagccctaaaggagccagggcagggagccaccacctacctgtgacaaagctgtgctgtgataca
gctgaaatctggaaacaggggtgaccagtaactctgcatggtggccacagggccttgcccatagaacttaccagaagaccatcg
accgtctgtggcgtaaacccaccaatgtcagcgtgtctgtgatcatgtcagaggagattgataatctagat

Amino acid sequence:

15 MDFQVQIFSLFLISASVIIARGQIVLSQSPAILASASPEKVTMTCRASSSVSYMHWY
QKPKGSSPKPWYAPNSLASGVPARFSGSGSTSYSLTISRVEAEDAATYYCQQWS
FNPTFTAGTGLLEKLDGGSGGGSGGGSSQAYLQQSGAESVRPAGSVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSS
TAYMQLSSLTISEDASVYFCARVVYYNSYWFYDVGWGTGTVTVSSDHCSPTTP
20 PPPSQPSLSLQRPALDLLLLGSDASITCTLNGLRDPEGAFTVWEPSTGKDAVQK
AVQNSCGCYSVSSVLPGCAERWNSGASFCKTVTHPESDTLTGITIAKVTVNTFPPQV
HLLPPSEELALNELVSLTCLVRAFPKPEVLVRWLHGNEELSPESYLVEPLKEPGE
GATTYLVTSVLRVSAEIKWQGDQYSCMVGHEALPMNFTQKIDRLSGKPTNVSVS
VIMSEG

A. mIgA WCH2 T4CH3

Nucleotide sequence:

Gtggatgacacatctgtctctctactactctctcacccttctgccagccagcgtctactgacagcggcagctctgagga
ctgctctctgggttcagatgccagcatcacatgtactctgaatggcctgagagatcctgaggagctgtcttaccctgggagccctc
30 cactggaaaggatgcagctgcagaagaagctgtgcagaattctgcggctgtacagtggtccagcgtctcctgcctgctgtgctg
agcgtctggaacagtggcgatcattcaaggtgcacagtaccatctgagctgacaccttaactggcaaatgccaaagtacaa
gtgaacaccttccacccaggtccacctgctaccggcggcgtcggaggagctggccctgaatgagctcgtgtccctgacatgcc
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agccctaaaggagcaggcgaggaggccaccacctacctgtgtgacaagcgtgtgctgtatcagctgaaatctggaacagg
35 gtgaccagtaactctgcatgtggggccacgaggccttgccatgaacttaccacagaagaccatcgaccgtctgtcgggtaaacc
cacaatgtcagcgtgtctgtgatcatgtcagaggagattgataatctagat

Amino acid sequence:

40 DHICSPTTPPPSQPSLSLQRPALDLLLLGSDASITCTLNGLRDPEGAFTVWEPST
GKDAVQKKAQNSCGCYSVSSVLPGCAERWNSGASFCKTVTHPESDTLTGITIAKV
TVNTFPPQVHLLPPSEELALNELVSLTCLVRAFPKPEVLVRWLHGNEELSPESYL
VFEPLKEPGEATTYLVTSVLRVSAEIKWQGDQYSCMVGHEALPMNFTQKIDRL
SGKPTNVSVSVIMSEG

20. K322S CH2 region

Nucleotide sequence:

ctgaaactctgggggacgtgactcttctcttcccccaaaacccaggaacacctcatgatctcccgagccctgaggtcac
atgcgtggtgggtgacgtgagccacgaagaccctgaggtcaagttcaactgtgacgtggacggcggtggaggtgataatgccaa
gacaaagcccgaggagcagtcacacagcagctaccgtgtgtgctagcgtctcaccgtctgaccagcagctgctggaatg
50 gcaaggagtacaagtgctcgtgtccaaagacccctccagcccatcgagaaacaatctccaaagcaaa

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Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCSVSNKALPAIEKTISKAK

5

21. K322S CH2 WCH3

Nucleotide sequence:

ccctgaactctctgggggaccgtgacgtctctctctcccccacaaacacgaagacaccctcatgatctccggaccctgaggtcac
atgcgtgtggtggacgtgagccacgaagaccctgaggtcaagttcaactgtgacgtggacggcgtggaggtgcatatgcaaa
gacaaagccgcggggagagcagtaacaacgacgacgtacgtgtgtgacgctctcaccgtctgcaccaggaactggctgaatg
cgaaaggaglacaaagtctcgtctccaaacagccctccacgcccccatcgagaaaaaactctccaaagccaaaggcgagccc
cgagaacacacaggtgtacacacctgcccccatccgggatgagctgaccaagaccaggtgacgctgacctgctggctcaaaagg
cttctatccacgacatcggcgtggagtgaggagacaaaggcgagccggagacaactacaagaccacgctccgtctgctgg
actccagcggctcctctctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctccgtg
atgcatgaggtctctgcacacactacacgcagaagacctctcctctgctccgggtaaatgatctaga

15

Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCSVSNKALPAIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPV
LDSGDSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSLSPGK

20

1. K322L CH2 WCH3

Nucleotide sequence:

tgatcaggagcccaaatctctgacaaaactcacacatccccaccgtctcagcacctgaactctgggggaccgtcagcttctct
cttccccccaaaacaaagacaccctcatgatctccggaccctgaggtcacatgcgtgtgtgtggacgtgagccacgaaga
ccctgaggtcaggttcaactgtgacgtggcggcgtggaggtgcataatgccaagacaagccggcgaggagcagcacaaca
cagctgaccgtgtgtgtgacgctctcaccgtctcgcacacggactggctgaatggcaaggatcacaaagtcctgtctcaca
agccctccacgctccccatcgagaaaaaactctccaaagcnaaggcgagcccgagaaaccagaggtgtacacctgccccat
ccgggatgagctgaccaaagaacacaggtcagcctgacctgctgtcaaaaggcttctatccagcgacatcgccgtggagtggtg
agagcaatggcgagccgggagaaactacaagaccacgctcccgctgtggaactccgacggctcctcttctctcagacaagct
caccgtggacaagagcaggtggcgacaggggaacgtcttctcatgctccgtgatgatgaggtctgcacacactacacgca
gaagagcctctcctgtctccgggtaaatgatctaga

25

30

Amino acid sequence:

DQEPKSSDKTHTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHED
PEVKFNWYVDGVEVHNAAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCLV
SNKALPAIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVE
WESNGQPENNYKTTTPVLDSGDSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHN
HYTQKSLSLSPGK

40

22. 2H7 scFv VHL11S hIgG1 (SSS-S)H K322SCH2 WCH3

Nucleotide sequence:

aagcttgccgccatggattttcaagtcgacatttcagcttctcgtatcagtcgttcacgtatgaattgccagaggacaaatgttctct
ccagcttcacgaactctgtctgctcctccagggagaggtgcacatgacttcaggggccagctcaaggtgaagtacatgcact
ggtaccagcagaagccaggtactctcccccaaaccttgatttatgcccccaaacctggcttctggagctcgtctgctcagtg
gcagtggtgttggaaccttactctctcacaatcagcagatggaggtgaagatgctgccaattatctatgccagcagtgagttt
taaccacaccacgttcgggtgtgggaccaaagctggagctgaagaatggcgggtggctggggcgtgtgtgtgactggagaggtg
ggagctctcaggtctatctacagcagctgtggggctgagtcgggtgagcgtggggcctcagtgaaatgtctctcgaaggcttctggc
tacacatttaccagtatacatgatcaggtgtaagcagacacctgacagggcgtgaatggattggagctatttatccaggaat
ggtgatactctacaatcagaagattcaagggaaggccacactgactgtgacacaaatcctcagcagagctcactatgcagctcag

50

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PT/US2003/041600

cagcctgacatctgaagactctgcggctctattctgtcgaagagtggtgtactatagtaactcttacttggtactctgatgtctggggcac
aggggacacgctgacacgtctctctctgtatcaggagcccaaatctctgacaaaactcacatccccaccgtctctcagcaccttgaaact
cctggggggacgcctgactctctctcccccaaaacccaaggacacccctcatgaltccgggacccctgaggtcacatgcgtgg
tgggtgacgtgagccacgaagaccctgaggtcaagtcaactgtgactgtgcagggcggtggaggtgcaatgccaagacaagc
cgcggggagagcaggtacaaacagcagctaccgtgtggctcagcgtctccactgcctcaccaggactggctgaatggcgaaggag
tacaagtgctcgtgtcccaaaaagccctccacgccccatcgagaaaacaaatctcctcaagccaaaggcgagccccgagaacca
caggtgtacacccctgccccatcccgggatgagctgaccaagaacacaggtgacgctgacgtcctgctgcaaaagccttcatacca
ggacacatcgccgtgagtgaggagcaatggcgagccgggaacaaactacaagacacgcccctccgtctgagctcagcgagcg
ctcctctctctctacagcaagctcaccgtggacagagcaggtggcgacaggggaacgtctctcatgctccgtgatgcgatgagg
ctctgcacaacactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSLILISASVIIARGQIVLSQSPAILASAPGKEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSTSYSLTISRVEAEDAATYYCQQWS
FNPTTFGAGTKLELKDGGGSGGGSGGGSSQAYLQSQGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRGLEWIGAIYPNGNDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSDHSAVYFCARVYYNSYWFYDVGWGTGTTVTSSDEPKSSDK
THTSPSSAPPELLGPGSVFLFPPKPKDILMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVVEHNAKTKPREEYQYNSTRYRVSVLTVLHQDWLNGKEYKCSVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNPQEN
NYKTTTPVLDSGFFLYSKLTVDKSRWQQGNVFCSSVMHEALHNHYTQKSLSLS
PGK

23. 2H7 scFv VHL11S hIgG1 (SSS-S)H K322L.CH2 WCH3

Nucleotide sequence:

aagctgcccgcctgatttcaagtcgacgattttcagctctcctaactcagtgcttcagtcataatgagcaggacaaattgtctct
ccagctgtccagcaactcctgtctgcatctccaggggagaaagtcgaactgacgtgcagggccacgcaagtgtaagttaactgcact
gttacacagcagaagccagatcctcccccaaacctggattatgccccatcaactcgtcttggatcctctgctcgttcagtg
gcatggtggtctgggacctcttactctctcaaatcagcagagtgaggcgtgaagatgctgccattattatgccagcagtgaggatt
taaccacaccacgtgtcgtctgggaccaagctggagctgaaagatggcggfgtcgtggcggtgtgtgcatctggagggaggtg
ggagctctcagccttatctacagcagctcggggtgagtcgggtgagcctggggcctcagtgagaatgtctctcnaagcctctggc
tacacatttacagttacaatgatcactgggttaaagcagacactagacagggcctggaagtggagtgagctattatccaggaat
ggtgalacttctctacacagaaagttcaaggcgaaggccacactgactgtagacaaatcctccagcacagcctcatcagcgtcag
cagcctgacatctgaagactctcgggtctattctgtcgaagagtggtgtactatagtaactcttacttggtactctgatgtctggggcac
aggggaccacggtcacctgtctctgtatcaggagcccaaatctctgacaaaactcacatccccaccgtctcagcacctgaaact
ctggggggacgcgtcagctctctcctcccccaaaacccaaggacacccctcatgaltcccgaccctgaggtcacatgcgtgg
tgggtgacgtgagccacgaagaccctgaggtcaagltcaactgtgactgtgagcggcggtggaggtgcaatgccaagacaagc
cgcggggagagcgttacaaacagcagctacgtgtgggtcagcgtctcactcgtcgcacaggactggctgaatggcgaaggag
tacaagtgctgtgtctcacaagaacccctccagccccatcgagaaaacaaatctcacaagccaaaggcgagccccgagaacca
caggtgtacacccctgccccatcccggtgagctgaccaagaacacaggtgacgtcgtcgtcgaaggtcttatacca
ggcagatcgccgtggagtgaggagcaatgggcagcgggagaacaaactacaagaccacgctccgtgctgagctcagcagc
ctcctctctctctacagcaagctcaccgtggacaagagcaggtggcagcgggggaacgtctctcatgctccgtgatgcgatgagg
ctctgcacaacactacacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSLILISASVIIARGQIVLSQSPAILASAPGKEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSTSYSLTISRVEAEDAATYYCQQWS
FNPTTFGAGTKLELKDGGGSGGGSGGGSSQAYLQSQGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRGLEWIGAIYPNGNDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSDHSAVYFCARVYYNSYWFYDVGWGTGTTVTSSDEPKSSDK

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THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
DGVVEVHNNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCLVSNKALPAPIE
KITISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
5 PGK

24. 2H7 scFv VHL11S hIgG1 (CSS-S)H K322SCH2 WCH3

Nucleotide sequence:

aagcttgccgccatggaatttcaagtgacagatttcagcttctcgttaatcagtgcttcagtcataattgccagaggacaaattgttctt
cccagctctccagcaatctgtctgtcatctccaggggagaaggcacaatgactgcagggccagctcaagtgtaagtacatgcaat
10 ggtaccagcagaaagccagatctcccccacaacctggtattatgcccatccaacctgctcttgaggctcctgctcgttcagtg
gcagtggggtctgggacctcttactcttcacatacagcagatggaggctgaagatgctgccatttactgccagcagtgagggtt
taacccacccagcttggtgctgggaccaaagctggagctgaagatggcggtggctggcggtggtggatctggaggaggtg
ggagctctcaggcttatctacagcagcttggggctgagtcgtggagccctggggcctcagtggaagatgctcgcgaaggctctggc
15 tacacattaccagttacaatgatcactgggtgaagcagacacctagacaggcctggaatgattggagctatttaccaggaat
ggtgatactctcacaatcagaagttcaaggccaaaggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
cagctgacatctgaagactctgcgtctatttctgtgcaagagtgctgtaactatgtaactcttactgtgcttctgagctctggggc
agggacacagcgtgcaccgltcttctgatcaggaagcccaactctgtgacaaaactcacatccccaccgctctcagcaccctgaat
cctggggggagccgtcagcttctcttccccccaaaaccgaaggacacctatgatctccggaccctgagtcacatgcgtgg
20 tgggtgacgtgagccacgaagacctgaggtcaagttcaactggtacgtggagcggtgcgtgagctgataatgccagacaaagg
cgcgggagagacagtlacacagcacgtlaccgtgtgtgacagctcctcaccgctcaccaggaagctgctgaatggcgaaggag
tacaagtgctcgtgtcccaaaagccctccagccccatcgagaaaacaaatccaaagcccaaggcgagccccgagaacca
caggtgtacacctgcccccatccgggatgagctgaccaaagacaggctgacgtgacctgctggtgcaaaagcttctatccca
cgcgacatcgctggagtgaggagagaatggcgacgcccggagaaactaacaaagaccagcctccgtgctgagctccgacgg
25 ctccttctctctacagcaagctaccgtggacaaagcagcaggtggcagcaggggaacgtcttctcatgctccgtgatgatcaggg
ctctcgaaccactacacagagaagacgtctcctctcctgggtaattgatcaga

Amino acid sequence:

MDFQVQIFSLLISASVIIARGQIVLSQSPAILASASPGKEVTMTCRASSSVSYMHWY
30 QKQKPGSSPKPWYAPSNLASGVPARFSGSGSSTYSLSIRVEAEDAATYYCQQWS
FNPTFGAGTKLELKDGGSGGGGGSGGSSQAYLQQSQAESVRPGASVVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFGKTKALTITVDKSSS
TAYMQLSSLSEDSASVYFCARVYYNSNSYWFYFDVWGTGTTTGTVTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYV
35 DGVVEVHNNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCVSNKALPAPIE
KITISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLS
PGK

25. P331S CH2

Nucleotide sequence:

cctgaactctctgggggagcgtcagctctctcttcccccaaaaccgaaggacacctatgatctccggaccctcagggtcac
atgctgtgtgtgggtgagctggagccacgaagacctgaggtcaagttcaactgtgacgtggacggcggtggaggtgcalaatgccaa
45 gacaaagccgcgggagagcagctacaaacagcacgtaccgtgtgtgacgctcctcaccgctcgcaccaggaactgctgaatg
gcaaggagtacaagtccaaggtctcccaaaagccctccacgctcctcagagaaaacaaatccaaagcga

Amino acid sequence

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKITISKAK

26. P331S CH2 WCH3

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PCT/US2003/041600

Nucleotide sequence:

5 cctgaacctcctgggggacctgcagtctctcttccccccaaaccgaagacacctcatgatctccgggacacctgagggtcac
atgcgtggtggtggacgtgagccacgaagacctgaggtaagtcaactgtgacgtggacggcgtggaggtgcataatgccaa
gacaagaagccggggagggagcagtaacaacgacgtaccgtgtgtgacgctctccacgtcctgaccaggactggtgatg
gcaagggtgtacaaagtcaaggtgtccaacaagccctccagcctccatcgaagaacaacttccaagaagccaaagggcagccc
cgagaacacagaggtgtacacctgccccatccccgggatgagctgaccaagaccaggtgcagcctgacctgctgtgcaaaagg
cttctatccagcgacatcgccgtggagtgaggagacgaatggcgagccggaggaacaactacaagaccacgctcccggtgctgg
actccgacggctctctctctctctacagaagctaccgtggacaagagcaggtggcgacaggggagacgtctctcatgctccgtg
atgatgaggctctgcacaaacctactacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence

10 PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPASIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPV
15 LDDSGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSLSPGK

27. 2H7 scFv VH L11S (SSS-S)H P331S CH2 WCH3

Nucleotide sequence:

20 aaggttgcgccatgatttcaagtgcagattttagcttctctgtaatacagtgcttcagtcataattgccaggacaaaattgtctct
cccagctctccagcaactctgtctgcalccaggggagaaagtcacaaatgactgcaggccagctcaagtgttaagtacatgcact
ggtaccagcagaagccagagctctcccccacacccctggatctatgcccatccaactgcttctggaggtccctgtcgtcgttcagtg
gcaatgggtctctgggaccltctactctcacaatcagcagagtggaaggtgaagatgctgccacttattactgccagcagtggtgatt
taaccuacccacgtctggtgtgctggaccaaagctggaagctgaaagatggcgggtgctcggcggtgtggtgagctggagagagtg
ggngctctcaggtattatcacagcagcttggggctgagtggtgagggcctggggcctcagtgaaagatgctcgaagcctctctggtc
25 tacacatttaccaggttacaatatgcactgggttaagcagacactagacagggcctggaaaggattggagctatttaccaggaaal
ggtgatacttctacaatcagaaggtcaaggcgcaagggccacactgactgtagacaatctccagcagacgctacatgcagctcag
cagcctgacatctgaagactctgcggtctatttctgtgcaagagtggtgtgactatagtaactcttaactggtacttcgaltgtctggggcac
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cctggggggaccgtcagctctctctctccccccaaaacccaagacacacctcatgatctcccggacctctgaggtcacatgctgtg
30 tgggtgacgtgagccacgaagacctgagggtcaaggttcaactggtgactgagcagcgtgaggtgtgataatggccagacaaaagc
cgcgggagggagcagctacaacgacgacgtaccgtgtgtgacgctctcaccgtctcgcaccaggactggtgtaatggcaaggag
tacaagtgcagggtctcacaagaagccctccagcctccatcagaanaaactctcacaagccaaaggcagccccgagaacca
caggtgtacacctgccccatccccgggatgagctgaccaagaacacgtagcctgactcgtcgttgcgaaggtcttctatcca
gcgacactgcgctgaggtggagagacaaatgggcagccggagagaacaactacaagaccacgctcccgctgctggactccgacgg
35 ctctctctctctacagaagctcaccgtggacaagagcaggtggcagcaggggagacgtctctctcatgctcgtgatgatgagg
ctctgcacaacctactacgcagaagagcctctcctgtctccgggtaaatgatctaga

Amino acid sequence

40 MDFQVQIFSFLIASVHIARGQIVLSQSPAILSASPGEKVTMTCRASSVSYMHWY
QQKPGSSSPKPIWYAPSNLASGVPARFSGSGSTSYSLTISRVEAEDAATYVCQQWS
FNPTPTGAGTGLLELKDGGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYFTTYSNMHWVKQTPRQGLEWIGAIYPGNQDTSYNQKFKGKATLTVDDKSS
TAYMQLSSLTSEDSAVYFCARVYVYNSYWFYFDVWGTGTTTVSSDQEPKSSDK
THTSPSPSAPPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVY
45 DGEVEHNAAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPASIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSLSPGK

28. 2H7 scFv VH L11S (CSS-S)H P331S CH2 WCH3

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PCT/US2003/041600

Nucleotide sequence:

5 aagcttgcgcgcattgattcaagtgcagattttcagcttctgctaalcagtgcttcagtcataattgccagaggacaaattgttctct
ccagctgtccagcaatctctgtctgcaicccaggggagaaagctcacaatgactgcaggggcagctcaagtgtaagttaacatgcact
ggtaaccagcagaagcggacgactctcccccaaacctcggattatgcccatccaacctggctcttggagtcctctgctgcttcagtg
10 gcaagtggctctgggacgtctctctcacaatcagcagagtgagggtgaagatgctgccacttattatgccagcagtgaggatt
taaccaccacggttcgggtgctgggaccanctggagctgaagatggcgggtggctcggcggtggatctggaggaggtg
ggagctctcagggctatclacagcagctctggggctgagtcgggagggcctcagtggaagatgctcgcgaaggctctggc
taccactttaccagtacaatatgcactggglaagcagacacctagacaggggcctggaaatggattggagctattatccaggaaat
gggtatacttctacatcagaagttcaaggggcagggccacactgactgtagacaaatctccagcacagcctacatgcagctcag
15 cagcctgacatctgaagacgtcgggtctatttctgtgcaagagtggtgctactatagtaacttactggtactctgctggggcag
aggcgaccggcggfaccgtctctctgcatcaggagcccaatctgtgacaaaactcacatccccaccgctctcagcagcctgaact
ctggggggagcgtcagctctctctctcccccaaaacccaaggacacctcatgatctccggaccctgagggtcacatcgtgg
tgggtggacgtgagccacgaagacccctgaggtcaagttcaactgtgactggagcggcgtggaggtgcataatggccaagacaaagc
cggcgggagagcagctacacagcagctaccgtgtggctcagcgtctcaccgtctgcacacaggagctgctgaatggcaaggag
20 tacaagtgcgaaggctctcaacaaagccctccagcctccatcgagaaaacaatctcaaaagccaaaggcagccccgagaacca
cagggtgtacacctgccccatcccggtgatgctgaccaagaacaggctcagcctgactgtcgtgctcgaagggtcttactcca
ggcagatcggcgtggagtgaggagacaaatgggcagccggagaacaaclacaagacacgcctccgtgctgcacatccgcaggg
ctctcttctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctctatgctccgtgatgatgagg
ctctgcacaaccactacagcagaagagcctctcctgtctccggtaatgatctaga

Amino acid sequence

25 MDFQVQIFSLLISASVVIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSTSYSLTISRVEAEDAATYQCQWS
FNPTFTGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKALTIVDKSS
TAYMQLSSLTSEDSAVYFCARVYYNSNSYWFVDVWGTTGTTVTVSSDQEPKSCDK
THTSPSSAPPELLGSGSVFLFPPKPKDTLMISRNPTEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
20 DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK
GQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
30 NYKTTTPVLVDSGSSFLYSLKLTVDKSRWQQGNVFSQSMHEALHNHYTQKSLSLS
PGK

29. T256N CH2 region

Nucleotide sequence:

35 Cctgaactctctgggggacgctcagctctctctctcccccaaaacccaaggacacctcatgatctccggaaacctgagggtca
catcgtgtgggtggacgtgagccacgaagacctgagggtcaagttcaactggtacgtggagcggcgtggagggtgcataatgcga
agacaaagccggggagagcagctacacagcagctaccgtgtggctcagcgtctcaccgtctgcaccaggactggcgtgaat
ggcgaaggagtagtaagtgcaaggtctccaacaaagccctccagcccccatcagaaaacaatctccaaagccaaa

Amino acid sequence

40 PELLGGPSVFLFPPKPKDTLMISRNPTEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

30. T256N CH2 WCH3

Nucleotide sequence:

45 cctgaactctctgggggacgctcagctctctctctcccccaaaacccaaggacacctcatgatctccggaaacctgagggtca
atgctgtgggtggacgtgagccacgaagacctgagggtcaagttcaactggtacgtggagcggcgtggagggtgcataatgcga
gcgaagccggcggagcagcagctacacagcagctaccgtgtggctcagcgtctcaccgtctgcaccaggactggcgtgaatg
gcaaggagtagtaagtgcaaggtctccaacaaagccctccagcccccatcagaaaacaatctccaaagccaaaggcagccc
50 cgaagaaccacaggtgtacacacctgccccatcccggatgagctgaccaagaacaggtgcagcgtgactgctcgtgtcgaagg
cttctatccaggcagatcggcgtggagtgaggagcaatggcgacccggagaacaactacaagaccgctccctgctggtg

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PC/T/US2003/041600

actccgacggctctcttctctctacagcaagctcaccgtggacaaagcagcaggtggcagcaggcggaacgtctctcatgtccgtg
atgcataaggctctgcacaaacctacacgcagaaagcctctccctgtctccgggtaaatgatctaga

Amino acid sequence

5 PELLGGPSVFLFPPKPKDTLMISRNPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPV
LDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNYHTQKSLSLSPGK

10 31. 2H7 scFv VH L11S (SSS-S)H T256N CH2 WCH3

Nucleotide sequence:

aagcttgcgcgcattgatttcaagtcgagattttcagcttctctctaatacagtcgttcacgtcctaattgccagaggacaaattgttctct
ccagctctccagcaatcctgtctgtcctcctccaggggagaaagtcacaaatgacttcagggccagctcaagtglaagtacatgcact
15 ggtaccacagcagaagccagatctccccaaacctggattatgcccatcacaacctggtcttggagtcctctgtcgttcagtg
gcagtggtgtctgggaccttactctctcacaatcagcagagtgaggctgaagatgctgccattatcagccagcagtggtgatt
taaccacccacgttcgtgctgggaccaagctggagctgaagatggcggctcggcggctggatctggagggagggtg
ggagctctcagcgttatctacagcagctctgggctgagtcggtgaggcctggggcctcagtgaaagatgctcgaagcctctggc
20 tacacattaccagttacaataatgcactgggtaagcagacacactagacaggcctggaatggatggagcattatccaggnaat
gggtatcttccataacatcagaagttcaaggcgcaagccacactgactgttagacaatacctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcggctctattctgtgcaagagtgctgtactatagtaactcttactggtaactcgtctcgtggc
agggcacacggtcacctgtcctctctgtatcaggagcccaattcttgacanaactcacacatccccacgtctcagcagctgaact
25 ctctgggggacgtcagctgtctctctcccccacaaacccaaggacacctatgactctccggaacctgagcagctcagctcgtg
tgtgtgacgtgagccacgaagaccctgagtgctcaagtcaactggtacgtggcagggcgtggaggtgcatatgccaagacacaaagc
cgcggggagcagcagctacacagcagcagctaccgtgtggcagcgtctcaccgtctgccaccaggaactggctgaatggcgaagag
tacaagtgcaaggtgtccacaagaagccctccagccctcagcagaaacaaatctccaaagcacaaggcgacgcccagagaacc
30 acaggtgtacacccctcccccactccgggatgagctgaccaagaaccagctcagcctgacctgctgcaaggtcttatatccc
agcgacatccgtctggaggtggagagcaatggcgagccgggagaacactacaagaccacgctccctgctggaactcgaagc
gtctctcttctctacagcaagcgtcaccgtggcagaagcaggtggcagcagggggaactgtctctatgctccgtgatgcatag
gtctgcacaacactacacgcagaagagcctctctctcctgggtaaatgatctaga

Amino acid sequence

MDFQVQIFSLFLISASVVIARGQIVLSQSPAILSASPGKEVMTTCRASSSVSYMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGSGTYSYSLTISRVEAEDAATYYCQQWS
35 FNPPTFGAGTKLELKDGGSGGGSGGGSGGQAYLQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSS
TAYMQLSSLTSDSDAVYFCARVYVYNSYWFYDVGWGTGTITVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRNPEVTCVVVDVSHEDPEVKFNWY
VDGVEVIHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
40 EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNYHTQKSLSL
SPGK

45 32. 2H7 scFv VH L11S (CSS-S)H T256N CH2 WCH3

Nucleotide sequence:

aagcttgcgcgcattgatttcaagtcgagattttcagcttctctctaatacagtcgttcacgtcctaattgccagaggacaaattgttctct
ccagctctccagcaatcctgtctgtcctcctccaggggagaaagtcacaaatgacttcagggccagctcaagtglaagtacatgcact
50 ggtaccacagcagaagccagatctccccaaacctggattatgcccatcacaacctggtcttggagtcctctgtcgttcagtg
gcagtggtgtctgggaccttactctctcacaatcagcagagtgaggctgaagatgctgccattatcagccagcagtggtgatt
taaccacccacgttcgtgctgggaccagcgtggagctgaagatggcggctcggcggctggtggtggtctggagggaggtg

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ggagctctcaggcttatctacagcagctcggggctgagtcggtaggcctggggcctcagtgagaatgctctcgaagccttcggc
tacacattaccaggtacataatgcactgggtaaacgagcacctlagacaggccctggaatggatggagctattatccaggaaat
tggtatactctctacaatcagaaggtcaaggcgaagccacactgactgtagacaaatctccagcacagcctacatgcagctcag
cagcctgacatctgaagactctgcgctctatctctgtgcaagagtggtgactactagtaacletctactgctactctgatgctcggggc
5 agggaccacggctaccgctctctctgtatcaggagccaaatctgtgacaaaactcacacatcccccacccctctcagcactggaact
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cgcggggagcagcaggtacacagcagctaccgtgtgtgtagcgtctctacccgtctcaccagcagctgctgaaatggcgaaggag
tacaagtgcaaggtctcacaagaagccctccagcccccacgagaaaacaaatctccaaagccaaaggcgagcccgagaacc
10 acaggtgtacacccctgcccccacccggatgagctgaccaagaaccaggctcagcctgacctgcctgggtcaaaaggctctatccc
agcgacactgcctgtggaagtgggagagcaatgggcagccggagaacaactacaagaccacgctcccggtgctgacatccgacg
gtctctctctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctctatgctcctgtagatgatgag
gctctgcacaacactacagcagaagacctctccctgctctccgggtaaatgatctaga

15 Amino acid sequence
MDFQVQIFSFLISASVIIARGQIVLSQSPAILASAPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSTSYSLTISRVEAEDAATYTCQQWS
FNPTPTGAGTKLELKDGGGSGGGGGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGNDTSYNQFKGKATLTVDKSS
20 TAYMQLSSLTSEDSAVYFCARVYYNSNSYWFYFDVWGTGTTVTIVSSDQEPKSCDK
THTSPSPSAPPELLGGPSVFLFPPKPKDTLMISRNPEVTCVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLSL
25 SPGK

33. RTPE/QNAK (255-258) CH2

Nucleotide sequence:

30 cctgaactctctgggggaccgtcagttctctctctcccccacaaacccaaggacaccctcatgatctccagaacgtgaaggtcac
atgcgtgtgtgtgacgtgagccacgaagaccctgaggtcaagttcaactggtagctggacggcgtggaaggtgcaataatgccaa
gacaaagccgcgggaggagcagtaacaacgacgtaccgtgtgtgtagcgtctctcaccgtctcctgacacgaagctggtgaatg
gcaaggagtaacagtgcaaggtctocacaaaagccctccagcccccacgagaaaacaaatctccaaagccaaa

Amino acid sequence

35 PELLGGPSVFLFPPKPKDTLMISQNAKVTCVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

34. RTPE/QNAK (255-258)CH2 WCH3

Nucleotide sequence:

40 cctgaactctgggggaccgtcagttctctctctcccccacaaacccaaggacaccctcatgatctccagaacgtgaaggtcac
atgcgtgtgtgtgacgtgagccacgaagaccctgaggtcaagttcaactgtgtagctggacggcgtggaaggtgcaataatgccaa
gacaaagccgcgggaggagcagtaacaacgacgtaccgtgtgtgtagcgtctcaccgtctgacacgaagctggtgaaatg
gcaaggagtaacagtgcaaggtctcacaagaagccctccagcccccacgagaaaacaaatctccaaagccaaaggcagccc
cgagaaccacaggtgtacacctgcgcccccacccggatgagctgaccaagaacaggtgacgtcagctgctggttcaaaagg
45 ctctatccagcgcacatccgctggagtgaggagagcaatggcagccggagaacaactacaagacacagcctccctggtg
actccgagcgtctctctctctacagcaagctcaccgtggacaaagcaggtggcagcaggggaacgtctctctatgctcctg
atgcatgaggtctgcacaaactacacgcagaagacctctcctgctctccgggtaaatgatctaga

Amino acid sequence

50 PELLGGPSVFLFPPKPKDTLMISQNAKVTCVVDVSHEDPEVKFNWYVDGVEVHN
AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG

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35. 2H7 scFv VH L11S (SSS-S)H RTPE/ONAK (255-258)CH2 WCH3

[illegible]

30 MDFFQVQIFSLLISASVILARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QKQPGSGSPKWITYAPSNLASGVPARFSGSGSGTSYSLTISRVEADAATYYCQQWS
FNPPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPASVSKMSK
35 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGNDTSYNKFKGKATLTVDKSSS
TAYMLQSLSTEDSAVYFCARPVVYYSNSYWFDFVWGTGTTVTVSSDQEPKSSDK
THTSPSSAPELLGGPSVFLFPKPKDITMISQNAQVTCVVVDVSHEDPEVKFNWY
VDGEVHNAKTKPREEQYNSYTRVSVLTVLHQDWLNGKEYCKCVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
35 NNYKTTTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSQSVMEALHNHYTQKLSL
SPGK

Nucleotide sequence:

380

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PCT/US2003/041600

cgcggaggagcagtcacaacgacgacgaccgtgtggcagcgtctcaccgtctcgcaccaggactggctgaatgccaaggag
tacaaggccaaggctctcaacaaagccctccagcccccacgcagaaacaatccaaagccaaggcagccccgagaacc
acagggtgacacacctgcccccaccggatgagctgaccaagaaccaaggcagcctgacctggctgctcaaggcttctatccc
agcgacatcgccggggaggagcaatgggcagccggagaaacaactacaagaccgcctccgctgctgagctccgacg
gctctctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctatcctcctcgtgatcgatgag
gctctgcacaacactacacgcagaaagacctctcctgctctcgggtaaatgatctaga

Amino acid sequence

MDFQVQIFSLLSASVIIARGQIVLSQSPAILASAPGEKVTMTCRASSVSVMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGGTSYSLTISRVEAEDAATYYCQQWS
FNPTFGAGTKLELKDGGSGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDASVYTCARVYYNSYWFYFDVWGTGTTVTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISQNAKVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
NNYKTTTPVLDSGSFFLYSKLTVDKSRWQQGNVFSCSVMEALHNHYTQKSLSLSPGK

36. K290Q CH2 region

Nucleotide sequence:

cctgaactcctgggggaccgtcagctctctctcccccaaaacccaaggacacctcatgatctccggaccctgaggtcac
atgcgtgggtggagctgagccacgaagacctgaggtcaagttaacctgtacgtggagcggcgtgaggtgcataatgccaa
gacacagccggggaggagcagtcacaacgacgacgtaccgtgtgtcagcgtctcaccgtctcgcaccaggactggctgaatg
gcaaggagtcacaaggtcaaggtctccacaanaagccctccagcccccacgcagaaacaatctccaaagccaaa

Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTQPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK

37. K290Q CH2 WCH3

Nucleotide sequence:

Cctgaactcctgggggaccgtcagctctctctcccccaaaacccaaggacacctcatgatctccggaccctgaggtca
catcgtgtgtggagcagctgagccacgaagacctgaggtcaagttaacctgtacgtggagcggcgtgaggtgcataatgccaa
agacacagccggggaggagcagtcacaacgacgacgtaccgtgtgtcagcgtctcaccgtctcgcaccaggactggctgaat
ggcaaggagtcacaaggtcaggtctccacaanaagccctccagcccccacgcagaaacaatctccaaagccaaggcagcc
cggagaaccacaggtgtacacctgcccccacccgggagtgagctgaccaagaaccaggtcagcctgacctgctcgtggccaag
gcttctatccagcagacatcgccgtggaagtgaggagcaatgggcagccggagacaactacaagaccgcctcccgctgtg
gactccgagcggctctctctctacagcaagcaccgtggacaagagcaggtggcagcaggggaacgtctctctatcgtccgt
gatgcatgaggtcgtgcacaacactacacgcagaagagctctcctgctcgggtaaatgatctaga

Amino acid sequence:

PELLGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHN
AKTQPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQENNYKTTTPV
LDSGSFFLYSKLTVDKSRWQQGNVFSCSVMEALHNHYTQKSLSLSPGK

38. 2H7 scFv VH L11S (SSS-S)H K290Q CH2 WCH3

Nucleotide sequence:

aaagcttgcgccatggatttcaagtgacgatgttccagcttctgtaatacagtgcttcagcataaattgocagagacaattgttctct
ccagctctccagcaatcctgtctgcatctccagggagagagtcacaatgactgcaggccagcctcaagtgtaagtgtacatgcact

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ggtaccagcagaaggcagatctctccccaaccctgattatgcccacccaacctggtctctggagctccctgctcgttcacgtg
gcagctggctctggagaccltactctcacaatcagcagatggagctgaagatgctgccattactgccaagcagctggagatt
taaccacaccacgttcgtgctgggaccaagctggagctgnaagatggcggctgctcggcggtggtgagctggagctggagagctg
ggagctctcagcttatcagcagctctgggctgagctgggagcctgggagcctcagtgaaagatgctctcgaagctctctggc
tacaacttaccagttacaattgacatgggtggttaagcagacacctaagcagggcctggaatggattggagctattatccaggaat
5 ggtgatacttctacaatcagagttcaaggggcgaagggcaccactgactgtagacaantctccagcacagcctacatgcagctcag
cagcctgcacatctggaagcagctctcggctctattctgtgcaagatggtggtgactatagtaactcttactgtaactcagatgctcgggac
agggacacagctggacaccgtctctctgtatcaggagcccaaatctctgacaaactcacacatcccacgcctctcagaccctgaaact
ctctggggggacgtcgtctctctctctcccccacaaacgaagacacccctcatgatctccggaccctcaggttcacatgcgtgg
10 tggctgacgtgagccacgaagaccctgagtgcaaggtcaactggtacgtggagcggcgtggaggtgataatggccaagacacagc
cgcgggagagcagctacacacgacgacgtaccgtggtgacgctcctcaccgtctcgcacagcagctggctgaatgcaagag
tacaagtgcaaggcttccaacaaagccctccagcccccacgaaacaaatctcnaagccaaaggcgacccccgagaacc
acaggtgtacacccctgccccatccgggatgagctgacaagaacacggtcagcctgacctcgtctcgaaggctctctatccc
agcgacatcgccgtggagtgaggagcaatggcgacgccggagaacactacaagaccacgcctccgtctgctgactccagcag
15 gctctctctctctacagacgtcaccgtggacaaagacagcagtggaagcagggggaacgtctctctcatgctccgtgatcatgag
gctctgcaaccactacacgcgaagaagcctctcctctgctcgggtaaatgatctaga

Amino acid sequence:

MDFQVQIFSLIASVHARGQIVLSQSPAILASPGKEKVTMTCRASSVSVMHYW
20 QQKPGSSPKPWYAPSNLASGVPARFSGSGGTSYSLTISRVEAEDAATYYCQQWS
FNPTFTAGAGTKLELKDGGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFKGKALTLDKSSS
TAYMQLSSLTSEDSAVYFCARVVYYNSNYWYFDVWGTGTTTVTVSSDQEPKSSDK
THTSPSSAPPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVFKNWYV
25 DGVVEVHNAKTQPREQYNSYTRYVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMEALHNHYTQKSLSL
PGK

30 39. 2H7 scfv VH L11S (CSS-S)H K290Q CH2 WCH3

Nucleotide sequence:

aagcttgccgcacatgattttcaagtgcagattttcagctctcctaactcagtgcttcagtcataatgcccagagacaaaattgtctct
cccagctccagaactcctgtctgctcctcagggggaagagtcacaaatgacttgagcggccagctcaagtgtaattacatgcact
ggtaccagcagaagccagagatctcccccaaccctgattatgcccacccaacctggtctctggagctcctcgtcgttcactg
35 gcaatgggtctgggaccltactctctcacaatcagcagatggaggtgaagatgctgccattattactccaagcagtggaattt
taaccacaccacgttcgtgctgggaccaagctggagctgaaagatggcggtgctcggcggtggtgagctggagggaggtg
ggagctctcagcgttatctacagcagctcgggctgagctgggagcctcagtgaaagatgctcgcgaagctcttgctggc
tacaatttacaagttacaatattgcactgggttaagcagacacctaagacaggcctggaattgattgagagctattatccagaana
ggtgatacttctacaatcagaattcaaggggcgaagggcaccactgactgtagacaaatctccagcagcctacatgcagctcag
40 cagctcagactcgaagctctcggctctatttctgtgcaagngtgggtgactatagtaactctactggtacttctgattgctcgggac
agggacacacagctcaccgtctctctgtatcaggagcccaaatctgtgacaaaactcacacatcccacgtctcagaccctgaaact
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tggctgacgtgagcagcagaagaccctgaggtcgaaggtcaactggtacgtggagcggcgtggaggtgacatgaatgctcgggac
cgcgggagagcagctacacacgacgtaccgtggtgacgctcctcaccgtcctcaccagcagctggctgaatgcaaggag
45 tacaagtgcaaggcttccaacaaagccctccagcccccacgnaaaactctcnaagccaaaggcagccccggaacac
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gctctctctctctacagaggtcaccgtgggacaaagcagctggcgacagcagggggaacgtcttctcatgctcctgctgatgag
50 gctctgcacaaccactacacgcgaagaagcctctcctgctcctcgggtaaatgatctaga

Amino acid sequence:

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PT/US2003/041600

MDFQVQIFSLILISASVILARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QKPKGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGGSGGGSGGGSSQAYLQQSQAESVRPGASVMSKSC
ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPNGDTSYNQKFGKATLTVDKSSS
5 TAYMQLSSLTSEDSAVFYFCARVYVYSNSYWFYDVGWGTFTVTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLFPPKPKDITLMISRTPTEVTCVVVDVSHEDPEVKFNWYV
DGVVEVHNAKTPQREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPRPEQVYVTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
10 NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSQSVMEALHNHYTQKSLSLS
PGK

40. A339PCH2

Nucleotide sequence:

cctgaactcctgggggaccgtcagctctctctctcccccaaaacccaaggacacctcatgatctccggaccctcagggtcac
15 atgcgtggtggtggacgtgagccacgaagacctgaggctcaagtcaactggtaacgtgacggcgtggaggtgcataatgccaa
gacaaagccgcggggagagcagtaacaacgacgtaccgtgtggtaacgtgctctcaccgtctgcaccagcagctgagctgaatg
gcaaggagtacaagtgcacaggtctccaacaagccctccagcccccacagagaanaacatctccaaaccccaaa

Amino acid sequence:

PELLGGPSVFLFPPKPKDITLMISRTPTEVTCVVVDVSHEDPEVKFNWYVDGVVEVHN
20 AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKPK

41. A339P-CH2 WCH3

Nucleotide sequence:

cctgaactcctgggggaccgtcagctctctctctcccccaaaacccaaggacacctcatgatctccggaccctcagggtcac
25 atgcgtggtggtggacgtgagccacgaagacctgaggctcaagtcaactggtaacgtgacggcgtggaggtgcataatgccaa
gacaaagccgcggggagagcagtaacaacgacgtaccgtgtggtacgtctctcaccgtctgcaccagcagctggtcgaatg
gcaaggagtacaagtgcacaggtctccaacaagccctccagcccccacagagaanaacatctccaacccaaggagcagccc
30 cgaagaaccacaggtgtacacctgcctccatcccgggatgagctgaccaaagaacagggtcagctgacctgctgtgcataaagg
cttctatccagcagacatcgccctggtggatggagagcaatggcgagccggagaacaactacaagaccagccctccctgctggtg
actccgagcctctctctctctacagcaagctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctccgtg
atgcatgaggtctgtccaaacctacacgcagaagagacctctctctgctccggtaaatgatctaga

Amino acid sequence:

PELLGGPSVFLFPPKPKDITLMISRTPTEVTCVVVDVSHEDPEVKFNWYVDGVVEVHN
35 AKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKPKG
QPREPQVYVTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPV
LDSDGSFFLYSKLTVDKSRWQQGNVFSQSVMEALHNHYTQKSLSLSPGK

42. 2H7 scFv VHL1S (SSS)-SII A339P CH2 WCH3

Nucleotide sequence:

aagctgcgcgcagtgatttcaagtcagattttcagctctctgtaatacgtgttcacgtacataattgccagaggacaaattgtctct
cccagctctccagcaatcctgtctgcatctccaggggagaaagtcacaaatgacttcgaggcgccagctcaagtgtaagttacatgcact
45 ggtaccagcagaagccaggatctccccaacctggattatgcccactcaacctgctgtctgtgagctcctgtctgctgtcagtg
cagtggtgctgggacctcttactctctcacaatcagcagagtgagggtgaagatgctgccatttacttccagcagtgaggattt
taaccacacacagctgtcgtgctgggacgaagctggagctgaaagatggcgggtgctcggggcggtggatctggaggagggtg
ggagctctcagcttatctacagcagcttggggctgagtcggtagggcctgagcaagatgctcctgcaaggctctgtcgc
20 tacaattaccagttacaatatgcactgggtanaagcagacactagacagggcctggaatgattggagctatttaccaggaat
ggtgatactctacaatcagaatgtcaaggcgcaagccacactgacttgagacaatactccagcagcagcctacatgcagctcag
cagcctgacactgaagactctcggctattctgtgcaagagtggtgtactatagtaactcttactgctgatgtctggggcac

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agggaccacgcgtcaccgtctctctgatcaggagcccaaatctctgacaaaactcacacatccccaccgtctcagcacctgaact
cctcgtggggaccgtcagctctctctctcccccaaaacccaaggacacctcatgatctcccggagccctgagggtacatgcgtgg
tggtggacgtgagccacgaagacctgaggtcaangttcaactggtacgtggagcgcgtggaggtgcataatgccaaagacaaagc
cgcggaggagcagatcaaacagcacgtaccgtggtggtcagcgtctcaccgtcctcaccaggagactgctgaatggcaaggag
5 tacaagtgcaggtgtccaaagaagccctccagcccccattcgaaaaactctccaaaccaaagggcagccccgagaacc
acagggtgtacacctgcccccaccggatgagctgaccaagaaccaggtcagcctgacctgctggtcgaaggctcttatccc
agcagcatcgccgtgaggtggagagcaatggcagccggagaacaaactacaagaccagcctccgctgctgactccgacg
gctcctctctctctacagcaagctaccgtggacaagcaggtggcagcagggggaactctctcatgctcctgatgatgatgag
gctctgcacaaccaclacacgcgaagaagcctctcctgtctccggtaaatgatctaga

10 Amino acid sequence:
MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQWWS
FNPTTFGAGTKLELDGGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
15 ASGYTFTSYNMHWVWKQTPRQGLEWIGAIYPNGDTSYNQKFKGKALTIVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSNSYWFYDVGWGTGTVTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYV
DGVEVHNAKTKPREEQYNSTRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKPKGQPREEQYNTLVLPSPRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
20 NYKTTTPVPLDSGSFFLYSKLTVDKSRWQQGNVFSCSVMEALHNHYTQKSLSLS
PGK

43. 2H7 scFv VHL11S (CSS-S)H A339P CH2 WCH3
Nucleotide sequence:
25 aagcttgcgccatggatgttcaagtgacagatttcaactctctgaatcagtgcttcacgataaifccagaggagcaaatgttctct
cccagctccagcaatctctgtctgcatctccagggagagaaggtcacaactgactgcagggccagctcaagtgtaagtacatgcaat
ggtaccagcagaagccaggaatcctcccccaaacctggaattatgcccacccaactggtctggagtcctgtctgcttcaatg
gtagtgggtctgggacctcttactctctcaaatcagcagagtgagggtcgaagatgctgccactattactgccagcagtggaagt
30 taaccacccacgttccgtctgggaccacagctggagctgaaagatggcggtgctcggggcggtggtggtatcggaaggaggtg
ggagctctcagcgttctatcacagcagctcgggctgagtcggtggagcctgggacctgaggaatgactcctcgaaggcttctggc
tacacatttaccagttacaatgcaactgggtaagcagacacctagacaggccctgggaatggattgagctattatccaggaaat
ggtagacttctcaaatcagaagttcaaggcccaagccacactgactglagacaaactccagcagcagcctacatcgactcag
cagcctgacatctgaaagcctcgtctctatttctgcaagagtggtgtactatagtaactcttactggtactctgctggggac
35 agggaccacggtcaccgtctctctgatcaggagcccaaatctgtgacaaaactcacacatccccaccgtctcagcacctgaact
ctctggggggcagcgtcagctctctctcccccaaaacccaaggacacctcatgatctcccggaccctgaggtcacatcggtg
tggtgagctgagccacgaagacctgaggtcaagttcaactgtacgtggagcgcgtggaggtgcataatgccaaagacaagc
cgcgggagcagcaglacaaagcagctaccgtgtgtgctcagcgtctcaccgtcctgcaccagcagctgctgaatggcaaggag
tacaagtgcaagctccaacaaagccctcccagcccccacgagaaaacactccaaacccaaaggcagccccgagagaacc
40 agcagctgtacacctgcccacalcceggatgagctgaccaaagaaccaggtcagcctgacctgctgttcaaggctcttatccc
agcagcatcgccgtggagtgaggagcaaatggcagccggagaaacaaactacaagaccagcctccgtgctggactccgacg
gctcctctctctctacgaagctcaccgtggacaagcaggtggcagcaggggaactctctctatcagctcctgactgatgatgag
gctctgcacaacctacacgcgaagagcctctcctgtctcgggtaaatgatctaga

45 Amino acid sequence:
MDFQVQIFSFLISASVIIARGQIVLSQSPAILSASPGEKVTMTCRASSSVSYMHWY
QQKPGSSPKPWYIAPSNLASGVPARFSGSGSGTSYSLTISRVEAEDAATYYCQWWS
FNPTTFGAGTKLELDGGGSGGGGSGGGSSQAYLQQSGAESVRPGASVKMSCK
50 ASGYTFTSYNMHWVWKQTPRQGLEWIGAIYPNGDTSYNQKFKGKALTIVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYNSNSYWFYDVGWGTGTVTVSSDQEPKSCDK
THTSPSSAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYV

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DGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKPKGQPREEPVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPEN
NYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSCVMHEALHNYHTQKSLSL
PGK

5

44. G28-1VH

Nucleotide sequence:

gcggctccagctcgacgagctcgacctgagctggaaaagcctggcgcttcagtggaattctcgcaaggctctgttactcatic
10 actgctcacaatatgaactggggtgaagcagaataatgaaagagccttgagtggaattggaatattgatccttattatgggtgacta
ctcaacaacgggaagtctcaaggcgaagccacattgactgtagacaaatctccagcacagcctacatgcagctcaagagctctgac
atctgaggactctcgagctctattactgtgcaagatcgctggccctatggactactggggtcaaggaaacctcagtcaccgtctctct
gatcag

15 Amino acid sequence:

AVQLQQSGPELEKPGASVKISCKASGYSFTGYNMNWVKQNNGKLSLEWIGNIDPY
YGGTTYNRKFKGKATLTVDKSSSTAYMQLKSLTSEDSSAVVYCARSVGPMDYWG
QGTSTVSSDQ

20 45. G28-1VL

Nucleotide sequence:

aagcttgccgccatggtatccacagctcagttccttgggttgctgctgctgtggttcacaggtggcagatgfgacatccagatgact
25 agtctcagctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaatgtttacagttatttggctgggt
atcagcagaacaacgggaaatctcctcagctcctgtctcttttgcacaaaccttagcagaaggtgtgcatcaagggttcagtgga
gtggtacagcagcacagttttctctgaagatcagcagcctgagcctggaagtctggaagttattctgtcacacatcctcgataat
cctgtgagcttccggtggagccaccgaactggagatcaaaaggtggcggctggcggcgggtgtggtgtcgggtggcggcggat
cgtga

30 Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIOMTQSPASLSASVGETVTTTCRTSENVSYSYLAW
YQQKQKGKSPQLLVFAKTLAEGVPSRFSGSGGTQFSLKISSLQPEDSGSYFCQHH
DNPWTFGGGTELEIKGGGGSGGGSGGGSS

35 46. G28-1 scFv

Nucleotide sequence:

aagcttgccgccatggtatccacagctcagttccttgggttgctgctgctgtggttcacaggtggcagatgfgacatccagatgact
agtctcagctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaatgtttacagttatttggctgggt
40 atcagcagaacaacgggaaatctcctcagctcctgtctcttttgcacaaaccttagcagaaggtgtgcatcaaggttcagtgga
gtggtacagcagcacaggtttctctggaagatcagcagcctgagccttggaagtattctgtcaacatcattccgataat
ccgtggagcttccggtggagccaccgaactggagatcaaaaggtggcggctggcggcgggtgtggtgtcgggtggcggcggat
cgtcagcgggtcagctcgagcagctcgagctggaaagcctggcggctcagtggaagatttctgcaaggtctctgttact
cattacatgctacnaatgaaactgggtggaagcagaataatggaagagccctgagtggnatggaatattgatccttattatgtggt
actacctacaacgggaagtcaagggtcgaagccacattgactgtagacaaatctccagcacagcctacatgcagctcaagagct
45 gacatctgaggactctgcagcttattactgtgcaagatcgctggccctatggactactgggtcagaagaaacctcagtcaccgtctc
ttctgatcag

50 Amino acid sequence:

MVSTAQFLGLLLLWLTGGRCDIOMTQSPASLSASVGETVTTTCRTSENVSYSYLAW
YQQKQKGKSPQLLVFAKTLAEGVPSRFSGSGGTQFSLKISSLQPEDSGSYFCQHH
DNPWTFGGGTELEIKGGGGSGGGSGGGSSAVQLQQSGPELEKPGASVKISCKA

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SGYSFTGYNMNWKQNNKGSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMIDYWGQTSVTVSSDQ

5 47. G28-1 VHL11S

Nucleotide sequence:

gcggtccagctgcagcagctcgtgacctgagtcggaaaagcctggcgcttcagtgaaatttctgcaaggctcttggttactcattc
actggctacaatatgaactgggtgaagcagaataatggaagagccttgagtggaattgcaacttattatgtggtgacta
cctacaaccgggaagtccaaggcgaagccacattgactgtagacaataatctccagcacagcctacatgcagctcaagagctgcac
10 atctgaggaactctgcagctctattactgtgcaagatcggtcgccctatggactactggggtcaaggacctcagtcaccgtctctct
gatcag

Amino acid sequence:

15 AVQLQSGPSEKPGASVKISCKASGYSFTGYNMNWKQNNKGSLEWIGNIDPYY
GGTTYNRKFKGKATLTVDKSSSTAYMQLKSLTSEDSAVYYCARSVGPMIDYWGQ
GTSVTVSSDQ

20 48. G28-1 VHL11S scFv

Nucleotide sequence:

aagcttccgccatggtatccacagctcagttccttgggttctgctgctgtggcttacaggtgcagatgtgacatccagatgactc
agctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtgaataattttacagttatttgcttgg
atcagcagaacagggaanaattcctcagctcctgtctcttttgcataaaccttagcagaaaggtgtgccatcaagggtcagtgga
25 gtgcatcaggcacacagtttctctggaagatcagcagcctgcagcctgaagattctggaagtatttctgcaacalcattccgataat
ccgtggagcttcgtggaggaccgaactggagatcaaaaggtggcgggtgctcggcggtgtggtgggtcgggtggcgggggt
cgtcagcgttcagctgcagcagctgtgacctgagtcggaaaagcctggcgcttcagtggaagatttctgcaaggctcttggttact
catctactggctacaatatgaaactgggtgaagcagaataatggaagagccttgagtggaattggaatatgtatccttattatggtgt
actacctaacccggaagtccaaggcgaagccacattgactgtagacaataatcctccagcacagcctacatgcagctcaagagct
30 gacatctgaggactctgcagctctattactgtgcaagatcggtcggccctatggactactgggttcaaggaaacctcagtcaccgtctc
ttctgatcag

Amino acid sequence:

35 MVSTAQFLGLLLLWLTGGRCDIQMTQSPASLSASVGETVTTTCRTSENVSYLAW
YQQQKQKSPQLLVSFAKTLAEVPSRFSGSGGTQFSLKISLQPEDSGSYFCQHHS
DNPWTFGGGTLEIKGGGGSGGGSGGGSSAVQLQSGPSEKPGASVKISCKA
SGYSFTGYNMNWKQNNKGSLEWIGNIDPYYGGTTYNRKFKGKATLTVDKSSST
AYMQLKSLTSEDSAVYYCARSVGPMIDYWGQTSVTVSSDQ

40 49. G28-1 scFv (SSS-S)H WCH2 WCH3

Nucleotide sequence:

aagcttccgccatggtatccacagctcagttccttgggttctgctgctgtggcttacaggtgcagatgtgacatccagatgactc
agctccagcctccctatctgcatctgtgggagagactgtcaccatcacatgtcgaacaagtganaattgttacagttatttgcttgg
atcagcagaacagggaanaattcctcagctcctgtctcttttgcataaaccttagcagaaaggtgtgccatcaagggtcagtgga
45 gtggatcaggcacacagtttctctggaagatcagcagcctgcagcctgaagattctggaagtatttctgcaacalcattccgataat
ccgtggagcttcgtggaggaccgaactggagatcaaaaggtggcgggtgctcggcggtgtggtgggtcgggtggcgggggt
cgtcagcgttcagctgcagcagctgtgacctgagctggaagagcctggcgcttcagtggaagatttctgcaaggctcttggttact
catctactggctacaatatgaactgggtgaagcagaataatggaagagccttgagtggaattggaatatgtatccttattatggtgt
actacctaacccggaagtccaaggcgaagccacattgactgtagacaataatcctccagcacagcctacatgcagctcaagagct
50 gacatctgaggactctgcagctctattactgtgcaagatcggtcggccctatggactactgggttcaaggaaacctcagtcaccgtctc
ttctgatcagatcaggagcccaactcttgcataaaactcacacatccaccgtctctcagcacctgaactctggtgggagaccgtc

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atccccggatgactgaccaaagaaccaggtcagcctgacctgcctggctcaaaagcctctatccagcgcacatgccgtggagtgga
gagagcaatggggagcgcgggaagcaactacaagaccagcctcccgctgctggactccagcggctcctctctcagacaag
ctcaccgtggacaagagcaggtggcagcaggggaacgtctctcatgctccgtgatgatgaggtctgcacaaccactacacg
agaagagcctctcctgtctcgggtaaatgatctaga

5

Amino acid sequence:

MVSTAQFLGLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVVSYLAW
YQKQKQKSPQLLVSAFKTLAEGVPSRFSGSGGTQFSLKISSLPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGSGGGGSGGGSSAVQLQSGPSEKPGASVKISCKA
SGYSTGYNNMNWVKQNNGKSLIEWIGNIDPHYGGTTYNRKFKGKATLTVDKSSST
10 AYMLKSLTSEDSAVYYCARSVGPMIDYWGQGTSTVTVSSDQEPKSCDKTHTSPSS
APELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVH
NAKTKPREBQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIETISKAK
GQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
15 VLDSGSGFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKLSLSLSPGK

53. G28-1 scFv VH L11S (CSC-S)H WCH2 WCH3

Nucleotide sequence:

aaagtggcccatggtatccacagctcagttccttgggtgctgctgctggtgcttacaggtggcagatgtgacatccagatgactc
20 agtctccagctccctatctgcactgtgaggagactgtcacatcacatgtcgacaagaatgaaatgttaccagtatttggctggt
atcagcagaaacagggaataatctctcagctcctgctctcttggcaaaaccttagcagaagggtgctccatcaagggttcagtgga
ctggatcaggcacacagattttctcgaagatcagcagcctgcagcctgaagattctggaattattctgtcaacatcattccgataat
cgtggagacttctggggagcaccgcaactggagatcaaaagggtgctgctggcgcgggtgggtgggtgggtgggtgggtgggtgggt
25 cgtcagcggctcagcagcagctgtgacctgagctcggaaaaagcgtgctcagtggaagatttctgcgaaggctctgtgtact
cttaccatggctcaatagactgggtggaagcagaataatggaagacccctgattggattggaatattgacttattatgtggt
actacctacaacgggaagtcaaggcccaagccacafgactgtgacaaatctccagcagcagcctcatgagctcaagagct
gacatctgagcagctgctcagctclattactgtgcaagatcgtcggccctatgactactgggtcgaaggaactcagtcacagctctc
ttctgatcaggagcccaatctgtgacaaaactcacactctcaccgtgctcagcagcctgaactcctgggtgaccgtcagctctc
30 ctctcccccaaaacccaagcacacctctatgatctccggacccctgaggtcacatgctggtggtggtgagcgtgagccacgaag
acctgaggtcaagtctcaactggtacgtggcagcggctgagaggtgcataatgccaaagcaaaagccgcgggagggagcagtaaac
agcagctaccgtgtgctcagcgtctcaccgtctcaccaggactgctgaaatggcaaggagtacaagtgcaaggtctccaaca
aagccctccagcccccatcgagaaaacaatctcctcaagggcgaagccggcagagccagacaggtgtacacacctgccccca
tccgggatgagctgacaaagaaccaggtcagcgtacctgctgctcgaaggtcttctcacaagcgacatcgccgtgaggtgg
35 gagagcaatggcgagcgggagacaactacaagaccagcctccgtgctggactcgcagcgtctcttctctcctcactcagaag
ctcaccgtggaacaagcaggtggcagcaggggaacctcttctcatgctcgtgatgcatgaggtctctcacaaccactacacg
agaagagcctctcctgtctcgggtaaatgatctaga

35

Amino acid sequence:

MVSTAQFLGLLLWLTGGRCDIQMTQSPASLSASVGETVTITCRTSENVVSYLAW
40 YQKQKQKSPQLLVSAFKTLAEGVPSRFSGSGGTQFSLKISSLPEDSGSYFCQHHS
DNPWTFGGGTELEIKGGGSGGGGSGGGSSAVQLQSGPSEKPGASVKISCKA
SGYSTGYNNMNWVKQNNGKSLIEWIGNIDPHYGGTTYNRKFKGKATLTVDKSSST
AYMLKSLTSEDSAVYYCARSVGPMIDYWGQGTSTVTVSSDQEPKSCDKTHTSPPC
SAPELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVH
45 HNAKTKPREBQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIETISKAK
KGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPP
PVLDSGSGFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKLSLSLSPGK

50

54. G28-1 scFv VH L11S (SSC-P)H WCH2 WCH3

Nucleotide sequence:

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aagcttgcgcccatggatccacagctcagttccttgggtgctgctgctggtgttacaggtggcagatggtacatccagatgact
atgtccagcctccatctgcactgtgggagagactgtccatcacatgtcgaacaagtgaatgtttacgtattttgcttgggt
atgcacagaacaggaaatctctcagctcctgtctctttgcaaaaacctgacgaagggtgtggtacacaggttcagttggca
gtgacagcgcacacagtttctctgaaatcagcagcctgcagcctgaagatctggaagtatttctgcaacatcatctcgataat
5 cctgtgacgttgcgtgggagccaccgaactggagatcaaaaggtggcgggtgctcggcggtgggtgggtgggtggcggtgac
cgtcagcgttcacgtgcagcagcttggacgtgagtcggaaaagcctggcgctcagtgaaagtattcgaagctctctggtact
catctactggctacaatatgtaactgggtgagcagaataatggaaagagccttgagtggaattgaaattatgatccttattatggtgt
actacctacaaccggaaagtccaaggccaagccacattgactgtgacaaatcctccagcagacgctatgtagctcaagagctct
gacatctgaggactctgcagcttattactgtgcaagatggctggccctatggactactgggtcgaaggaaocctcagtcaccgtctc
10 tctgtatcaggagcccaatctctgacaaaactcacatccaccgtgcccagcactgaactcctgggggagccgtcagctctt
cctctcccccaaaaacccaaggacacctctatgatctcccgaccctgaggtcacaatgcgtgggtgtggtgacgtgagccacgaa
gacctgtgaggtcaagttcaactgtgacgtgagcggcgtggaggtgcataatgccaaagacaagcggcggtggagcagctacaa
cagcagctlacgtgtgtgacgtcctcaccgtcctgaccagagctggtgagtgaatggcgaaggagtgacaagtgaagctgtctcaac
aaagccctccagcccccactcagaaaacaaatctccaaagccaagggcagcccccagaaacacacaggtgtacacacctgccccc
15 atccgggatgagctgaccaagaacaggctgacgtgacctgacctgctcaaaagccttctatccagcgcacatgccgtggaggtgg
gagagcaatggggcagccgggaacaactacaagaccagccctccgtgctgagctccgacgggtcctcttctctacagaag
ctcaccgtgacaaagcagctggcagcaggggaacgtctctctatgctcctgtagtcatgaggtcctgcacaaccactacacgc
agaagagcctcctctctcgggtaaatgatctaga

20 Amino acid sequence:
MVSTAQFLGLLLWLTTGGRCDIQMTQSPASLSASVGETVTITCRTSENVYSYLAW
YQKQKGSQPLLVSFAKTLAEGVPSRFSGSGTGQFSLKISSLPQEDSGSYFQOHSS
DNFWTFGGGTELEIKGGGGSGGGSGGGSSAVQLQSQSGPESEKPGASVKISCKA
SGYSFTGYNNMNVVKQNNGKSLIEWIGNIDPYVGGTYYNKKFKGKATLTVDKSSST
25 AYMQLKSLTSEDSAVYYCARVGPMDYWGQGTSTVTVSSDQEPKSSDKTHTSPPCP
APELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVH
NAKTKPREQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAK
GQPREPQVYVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYIKTPP
VLDSDGSFFLYSKLTVDKSRWQQGNVFSQSCVMHEALHNHYTQKSLSLSPGK

30 II. 54. ICTLA4 IIIGI (SSS-S)II P238SII2 WCH3

Nucleotide sequence:

atgcttgccttggatttcagcggcacaaggctcagctgaacctggctgccaggacctggccctgcacttctgtttttctctcttc
atccctgtcttctgcaaaagcaatgcacgtggccacgctgctgtgactgcccagcagcgggcatcgccagctttgtgtgga
35 gtatgcatctccagcnaagccactgaggtccgggtgacaggtgtcggcaggtgacagccaggtgactgaagtctgtgcgc
aacctacatgacggggaatgagttgaccttctagatgattcatctgcagcggcactccagtggaatcaagtgaaactacat
ccaaggactgagggccatggcagcgggaactctacatctgcaaggtggagctcatgccaccgccatactactcgggcatagc
caacggcaaccagatttgaattgatccagaaccgtgccagattctgatcaaccaaatctctgacaaaactcacacatcccca
ccgtctctcagacctgaactcctgggggagctgacgttctctctctcccccaaaaacccaaggacacctctatgctcctggac
40 cctcaggtgcacatgcgtgtgtgtggacgtgagccacgaagacctgaggtcaagttcaactgtgacggcgtgaggggt
cgtatgaatggcaagcagcggcgaggagcagctacacagcagcaggtgtgtgtgacgtgtcctacctgtcggcagcag
actggctgaatggcaaggtgacaaagtgcgaaggtctccaaaagccctcccgccccatcgaaaaaactctccaaagcca
aaggcgaccccgagaacacaggtgtacacacctcccccatccgggatgagctgaccaagaagcaggtcagctgacctgc
ctgtgcaaggcttctatcccgagcgcacatcgccgtgaggtggagagcgaagcggcagccgggaacaaactacaagacacgccc
45 tcccgtgctgagctccgacggctccttctctctacagcagctaccgtggcaagagcaggtggcagcaggggaacgtcttct
catgctcctgtagtcatgaggtcctgcacaaccactacacgcagaagagcctcctctgtctccgggtaaatga

Amino acid sequence:

MACLGFRHQHKAQLNLAARTWPCTLLFFLLFIPVFCAMHVAQPAVVLASSRGIAS
50 FVCEYASPGKATFEVRVTVLRQADSQVTEVCAATYMTGNELTFLLDSDICTGTSSGN

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QVNLTIQGLRAMELDTGLYICKVELMYPPPYLGLIGNGTQIYVIDPEPCPDSDQPKSSD
KTHTSPPSSAPELDDGSSSVFLFPKPKDLMISRTEPVTCVVVDVSHEDPEVKFNWY
VDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPE
5 NNYKTTTPPVLDSDGSFELYSKLTVDKSRWQQGNVFCSCVMHEALHNNHYTQKSLSL
SPGK

55. Fe2-2 VL

Nucleotide sequence:

10 gttgtaagcttgccgccatggattcacagccccagggttcttatgttactgctgctatgggtatctggtacctgtggggacattgtgatg
tcacagcttcacatccctccctagctgtgctcagttggagagaagggttctatgagctgcaagtcacagtcagagccctttatataatcacaaat
caaaagaactacttgccctgtgaccacagatataccaggcgagctctcctaactgctgatttactgggcacctacatagggaatctgg
gtccctgafcgcttcacagcgagtgatctgggacagatttacctctaccatcagcagagtgtaagctgaagacctggcagttta
15 ttactgtcagaataattatatactatctccaccgttcggaggtggcaccaggctggaataaagggtggcgggtgctcggcggtg
gtgggtcgggtggcggcgggagctcg

Amino acid sequence:

MDSQAQVLMLLLLVWSGTCGDIVMSQSPSSLA VSVGEKVSMSCKSSQSLLYNHN
KQNYLAWYQIQPGSPKLLIYWASTRESGVDPDRFTGSGSGDTFTLTISR VKAEDLA
20 VYYCQQY YTYPTFGGGTKLEIKGGGGSGGGSGGGSGSS

56. FC2-2VH

Nucleotide sequence:

25 Gggagctcgcagctgctcagttgaaggagtcaggacctggcctggctggcgccctcacagagcctgtccatcacatgcacccgtctca
gggttctcatfaaccgtctatgggttaactgggtgccagctccaggaaaggctggactggctgggaatgatalggggtgat
ggagcagcagactataatcagctctcaaatccagactgagcatcagtaaggacaactccaagagccaagtttcttaaaaaaggac
agtctacaactgatgacacagccaggtactactgtgccagagatcactatgtaccacatgtatgactgactgggtcgaagga
acctcagtcaccgtctcctctgatcag

30 Amino acid sequence:
GSSQVQLKESGCPGLVAPSQSLSTCTVSGFSLTVYGVNVWRQPPGKGLDWLGMIV
GDGSTDYNSALKSRSLISKDNSQVFLKMDSLQTDTRYVCARDHYGTHYAM
DYWGQGTSTVTVSSDQ

35 57. FC2-2scFv

Nucleotide sequence:

40 gttgtaagcttgccgccatggattcacagccccagggttcttatgttactgctgctatgggtatctggtacctgtggggacattgtgatg
tcacagcttcacatccctccctagctgtgctcagttggagagaagggttctatgagctgcaagtcacagtcagagccctttatataatcacaaat
caaaagaactacttgccctgtgaccacagatataccaggcgagctctcctaactgctgatttactgggcacctacatagggaatctgg
gtccctgatcgtcttcacagcgagtgatctgggacagatttacctctaccatcagcagagtgtaagctgaagacctggcagttta
45 ttactgtcagaataattatatactatctccaccgttcggaggtggcaccaggctggaataaagggtggcgggtgctcggcggtg
gtgggtcgggtggcggcgggagctctcaggtgcagttgaaggagtcaggacctggcctggctggcgccctcacagagcctgtcc
atcacatgaccgtctcaggggtctcattaaaccgtctatggtgtaactgggtgcagagcctccaggaagggtctggactggtgg
gaatgatatgggtgatggagcagacagactataatcagctctcaaatccagactgagcatcagtaaggacaactccaagagccaa
45 gttcttaaaaatggacagctcacaactgatgacacagcaggtactactgtgccagagatcactatgtaccacatgtatgag
actactgggtcgaaggaacctcagtcaccgtctcctctgatcag

Amino acid sequence:

50 MDSQAQVLMLLLLVWSGTCGDIVMSQSPSSLA VSVGEKVSMSCKSSQSLLYNHN
KQNYLAWYQIQPGSPKLLIYWASTRESGVDPDRFTGSGSGDTFTLTISR VKAEDLA
VYYCQQY YTYPTFGGGTKLEIKGGGGSGGGSGGGSSQVQLKESGCPGLVAPSQ

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SLSTITCTVSGFSLTVYGVNVWRQPPGKGLDWLGMWGDGSTDYNSALKSRLSISK
DNSKSQVFLKMDSLQTTDDTARYYCARDHYGTHYAMDYWGQGSTVTVSSDQ

58. FC2-2 VHL11S

5 Nucleotide sequence:

gggagctctcagctgacgttgaaggagtcagaccctggctcggcggccctcacagagcctgtccatcacatgcaccgtctcag
ggctctcattaacctctatggtgttaactgggttcgccagcctccaggaagggtctggactggctgggaatgatatgggtgatg
gaagcacagactataatctcgtctcaaatccagactgagcatcagtaaggacaaactccaagagccaagtgtttcttaanaatggaca
gtctacaactgatgacacagccaggtactactgtgccagatgactactggtaaccactatgctatgactactggggccaaggaa
10 cctcagtcaccgtctctctgatcag

Amino acid sequence:

(GSS)QVQLKESGPGSVAPSQSLSTITCTVSGFSLTVYGVNVWRQPPGKGLDWLGM
WGDGSTDYNSALKSRLSISKDNSKSQVFLKMDSLQTTDDTARYYCARDHYGTHY
15 MDYWGQGSTVTVSSDQ

59. FC2-2 VH L11S scFv

Nucleotide sequence:

gttgtaagcttgcgccatgattcacaggccaggttcttatgttactgctgctatgggtatctggctacctgtggggacattgtgatg
20 tcacagcttccatcctccctagctgtgctagttggagagaagggtttctatgagctgcaagtcacagtcagacctttataatcacaaat
caaaagaaactacttggtccctggtaaccagcagataccaggcagctctcctaaactgctgatttactgggcatccactagggaatctgg
gttccctgatcgtcttcacaggcagtgatctgggacagattcacctcaccatcagcagagtgaaggctgaagacctggcagttta
ttactgtcagcaatattatacctatcctccacgttcggagggtggcaccaggctggaaataaaaggctggcggctgctcggcggtg
25 gtgggtcgggtggcgcgggagagctctcaggtgaggtgaaggaagtcaggacctggctcgggtggccctcacagagcgtctcc
ateacatgcaccgtctcagggtctcattaaacctctatggtgtaactgggttcgccagcctccaggaaaggctggactggctgag
gaatgatatgggtgatggaagcacagactataatcagctctcaaatccagactgagcatcagtaaggacaactcaagagccaa
gttttcttaaaaatggacagctcacaactgatgacacagcaggtaactatgctccagagatgactactggtaaccactatgctatgg
actactgggtgtaaggaaacctcagtcacccgtctctctgatcag

30 Amino acid sequence:

MDSQAQVLMILLLLVWSGTCGDIVMSQSPSSLAVSVGEKVSMSCKSSQSLYNIN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVDPDRFTSGSGSDTFTLTISRVAEDLA
VYYCQQYYTTPPTFGGGTKLEIKGGGGSGGGSGGGSSQVQLKESGPGSVAPSQ
SLSTITCTVSGFSLTVYGVNVWRQPPGKGLDWLGMWGDGSTDYNSALKSRLSISK
35 DNSKSQVFLKMDSLQTTDDTARYYCARDHYGTHYAMDYWGQGSTVTVSSDQ

60. FC2-2 (SSS-S)H WCH2 WCH3

Nucleotide sequence:

gttgtaagcttgcgccatgattcacaggccaggttcttatgttactgctgctatgggtatctggtactgtggggacattgtgatg
40 tcacagcttccatcctccctagctgtgctagttggagagaagggtttctatgagctgcaagtcacagtcagacctttataatcacaaat
caaaagaaactacttggtccctggtaaccagcagataccaggcagctctcctaaactgctgatttactgggcatccactagggaatctgg
gttccctgatcgtcttcacaggcagtgatctgggacagattcacctcaccatcagcagagtgaaggctgaagacctggcagttta
ttactgtcagcaatattatacctatcctccacgttcggagggtggcaccaggctggaaataaaaggctggcggctgctcggcggtg
45 gtgggtcgggtggcgggcgagagctctcaggtgaggtgaaggaagtcaggacctggcctgggtggcggcctcacagagcgtctcc
atcacatgcaccgtctcagggttctcattaaacctctatggtgtaactgggttcgccagcctccaggaaaggctgtggactggctgag
gaatgatatgggtgatggaagcacagactataatcagctctcaaaatccagactgagcatcagtaaggacaactccagagccaa
gttttcttaaaaatggacagctcacaactgatgacacagcaggtaactactgtccagagatgactactggtaaccactatgctatgg
actactgggtgtaaggaaacctcagtcacccgtctctctgatcaggaagcccaaatctctgcagaaactcacacatccaccgtctc
cagcaccctgaactctctgggtgacccgtcagcttctctctcccccnaaaccagaaggacaacctcatgatctcccggaacctgag
50 gtacatgctgtgggtgtgacctggaaccacgaagaccctgaggtcaagttcaactgtgacgtggacaggcggtggaggtgataat
gccaaagacaagccggcggaaggacngtacaacagcagctaccgtgtgtcagcgtctcaccgtctctgcacaggagactggt

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gaatgcaaggagtagtaagtgcgaaggtctccaaacagccctccagcccccatcgagaaacacatctccaaagccaaagggc
agccccgaagaccacaggggtgacacctgccccatccgggatgagctgaccaagaacaggtcagcctgacctgctgctca
aaggctctatccaaagacatcgccgtggagtgaggagagaggggacgcggagaaactacaagaccacgctctccgtg
ctggactccgacggctctctctctctacagcaagctcaccgtgacaaagagcaggtggcagcaggggaagctctctcatgctc
5 cgtgatgatgaggtctgcacaaccactacacgcagaagagcctctcctgctcgggtaaatgatctaga

Amino acid sequence:

MDSQAQVLMLLLLVWSGTCGDIVMSQSPSSLA VSVGEK VMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDRFTGSGSGTDFLTITSRVKAEDLA
10 VYYCQQYYTYPTTFGGGKLEIKGGGSGGGGSGGGSSQVQLKESGPGLVAPSQ
SLSIITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMWGDGSTDYNALKSRLSISK
DNSKSQVFLKMDSLQITDDTARYYCARDHYGTHYAMDYWGQGSTVTVSSDQEPK
SSDKTHTSPSSAPELLGGPSVFLFPPKPKDITLMISRTPEVTCVVVDVSHEDPEVKF
NWYVDGVEVHNATKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKA
15 LPAIEKTIKAKGQPREPQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESN
GQFENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ
KSLSLSPGK

61. FC2-2 VHL11S (SSS-S)H WCH2 WCH3

20 Nucleotide sequence:

gttgtaagcttgccgcacatgattcacagcccaggttcttatgtactgctgctatgggtatctggtacctgtggggacattgfatg
tcacagcttcacatccctcctagctgctgacttggaagaaggttctatgagctgcaagctccagtcagagcctttatataatacaaat
caaaaagaactacttgctgctggtaccagcagataccagggcagcttctaaactgctgatttactgggcatccactaggggaatctgg
ggtccctgaltcgtctacagcagcgtggtgatctggagcagatttactctcaccatcagcagagtgaaaggctgaagacctggcagcttta
25 ttactgtcagcaatattatactatctccacgttcgaggtggcaccagctggaataaaagggtgcccgtgtgctcggcggtg
gtgggtcgggtggcgccgggagctctcaggtgcagtgaaaggatcaggtcgtcgtcgtcgtccctcacagagcctgtcc
atcacatgacacgtctcaggggttctcattaacctgctatgtgttaactgggttcgccagcctccaggaaagggtctgacgtcgtg
gaatgatatgggtgatggaagcacagactataaactcagctcctcaaatccagactgacatcagtaaggacaaactcaagaccac
gtttcttaaaaaaggacgtctcaaaactgatgacacagccagggtactactgtgccagatcactatgtaaccaactatgctatgg
30 actactggggtcaaggaaacctcagtcacccgtctcctctgaltcaggcccaaatctctgacaaaactcacatccccaccgtctc
cagcacctgaaactcctgggtggacgtcagcttctctcttcccccaaaacccaaaggacacccctcatgctctccggaccctgag
gtcacatcgctggtggtggcagctgagccacgaagacctcagggtcaggttcaactgtgactgtgacggcggtggaggtgcataat
gccaaagacaagccgcgggagagcagctacaacagcacgtaccgtgtgctcagcgtctcaccgtctcaccagggaactggt
gaatggcaaggagtagcaaggtgcaagggtctccaaacaaagccctccagcccccacgcagaaaacactctcacaagccaaaggcg
35 agccccgagaacacaggggtacacacctgcccccacccgggatgagctgaccaagaacacaggtcagcctgacctgctgctga
aaggctctatccaagcgaatccgctgagtgaggagacaaaggcagccggagaaactacaagaccagcgtccctggtg
ctggaactccagcgctcctctctctctctacagcaagctcaccgtggaacagaagcaggtggcaggggaacgtctctcatgctc
cgtgatgatgaggtctgcacaaccactacacgcagaagagcctctcctctgctcgggtaaatgatctaga

40 Amino acid sequence:

MDSQAQVLMLLLLVWSGTCGDIVMSQSPSSLA VSVGEK VMSCKSSQSLLYNHN
QKNYLAWYQQIPGQSPKLLIYWASTRESGVPDRFTGSGSGTDFLTITSRVKAEDLA
VYYCQQYYTYPTTFGGGKLEIKGGGSGGGGSGGGSSQVQLKESGPGSVAPSQ
45 SLSIITCTVSGFSLTVYGVNWVRQPPGKGLDWLGMWGDGSTDYNALKSRLSISK
DNSKSQVFLKMDSLQITDDTARYYCARDHYGTHYAMDYWGQGSTVTVSSDQEPK
SSDKTHTSPSSAPELLGGPSVFLFPPKPKDITLMISRTPEVTCVVVDVSHEDPEVKF
NWYVDGVEVHNATKPREEQYNSTYRVSVLTVLHQDWLNGKEYKCKVSNKA
LPAIEKTIKAKGQPREPQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESN
GQFENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFSCSVMHEALHNHYTQ
50 KSLSLSPGK

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62. UCHL-1 VH

Nucleotide sequence:

atggcagcgttactctcttactctgctactgattgttctgcatatgtctctccagattactctgaagagcttgccctgggacttt
gcagccctccagaccctcagctgactgttcttctctgggtttcactgaccactatggtataggagtaggttggttcagcct
ccaagggaagggtctggagtgctgacacacatttggggaatgataataagfactataacacagccctcaggagccgggtcaca
tctccaaggattctcccaacaacaaagactctcctaagatgccaatgtggacactgcagataccgccacatactactgtctctacg
gtcactacttactggggccaaggactctggtcactgtctctga

Amino acid sequence:

MGRLTSSFLLLVPAAYVLSQITLKESGPGILQPSQTLSTLCSFSGFSLTITYGIGVGWIR
QPPGKLEWLTHIWVNDNKYYNTALRSRLTISKSSNNQVLLKIANVDTADTAT
YYCLYGYTYWGQGLTVLSA

63. UCHL-1 VL

Nucleotide sequence:

atgaagtgcctgttaggctgttggtgctgatgttctggattctgcttccatcagtgatgttgatgacccaaactccactctccctgc
cttcaagcttggagagacagcgtccatctcttctgcaatctagtcagagcccttcttacaataaggaaacacctatttacaattggatcct
gcagaagccagcgcagctcctcaaaactctgatctacaacatttccaaacgatitctgggggtccagacaggttcagtgccagtgagg
atcaggagacagatttcacactcaagatcagcagagtgaggctcagggatctggaggtttatctctctcaagtacacatgttccg
tggcgttctgggtggagcacaagctggaaatcaaa

Amino acid sequence:

MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDAQSISCRSSQSLLYSNGNTYL
HWYLYQKPGQSPKLLIYKLSNRFSGVPDRFSGSGSDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGKLEIK

64. UCHL-1 scFv

Nucleotide sequence:

gtgttaaagcttccgccatgaagttgcctgttaggctgttggtgctgatgttctggattctgcttccatcagtgatgttgatgaccc
aaactccactctccctgctgtcagcttggagatcagccctccactcttgcagatctagtcagagcccttcttacaataaggaaac
actatttacaattgggtaccctcagaagccagcgcagctcctcaaaactctgatctacaacatttccaaacgatitctgggggtccaga
caggttcagtgccagtgatgcagcagcagcagatttcacactcaagatcagcagagtgaggctcaggatctggaggtttatctctgctc
tcaangtacacatgttccgtggagcttccgggtggagccaccaagctggaaatcaagatggcgtgggtcggcggtgggtgatct
ggaggagtggtggagctctcagattactctgaagaagtctggccctgggatctgcagccctccagaccctcagctcgaattgttctt
tctctgggttttctactgaccactatggtataggagtaggttggttcagctcagccctcagggaagggtctgagtggtgcacacat
ttgtggatgataataaagactactataacacagccctgaggagccggctcacaactccaaaggattctctcacaacaaagactactc
caagatcgcaatgtggacactgcagataccgccacatactactgtctctacggctacacttacttggggccaaggactctgggtca
ctgtctctctgctgaca

Amino acid sequence:

MKLPVRLLVLMFWIPASISDVVMTQTPLSLPVSLGDAQSISCRSSQSLLYSNGNTYL
HWYLYQKPGQSPKLLIYKLSNRFSGVPDRFSGSGSDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGKLEIKDGGSGGGGSGGGSSQITLKESGPGILQPSQTLSTLCS
FSGFSLTITYGIGVGWIRQPPGKLEWLTHIWVNDNKYYNTALRSRLTISKSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGLTVTSAD

65. UCHL-1 VH IIISL12S

Nucleotide sequence:

gggagctctcagattactctgaagagctctgcccctgggactctgcagccctccagaccctcagctcagttctgttcttctctgggtt
tcaactgaccactatggtataggagtaggttggttcagcctccagggaagggtctggagtggctgcacacatttgggtggaat

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gataataagtactataacacagccctgaggagccggctcacaatctccaaagattcctccaaacaaagattcctcctcaagatgc
caatgtggacactgcagataccgccacatactactgtctctacggctacacttactggggccaaaggagactctggctactgtctctgct
gataca

- 5 Amino acid sequence:
(GSS)QITLKESGPGSSQPSQTLSTLCSFSGFSLLTTYGIGVGWIRQPPGKGLEWLTHIW
WNDNKYNTALRSRLTISKDSSNNQVLLKIANVDTADTATYYCLYGYTYWGQGT
LVTVSAD

10 **66. UCHL-1 scFv VH L11S**
Nucleotide sequence:

gtgtttaagctgccgccatgaagtgtgctgttaggctgttggctgatgtcttgattcctgcttccatcagtgatgttgatgacc
aaactccactctccctgccctgtcagcttggagatcaggccctcctcctcttgagatctagtcagagccctttacagtaatggaac
15 acctattttacattggtacctgcagaagccaggccagctctccaaactcctgatctacaactttccaacgattttctgggtcccaaga
cagggttcagtgccagtggatcaggagcagattcactcaaatcagcagagtgaggagctgaggatctggagattttctgtct
tcaaatgtacacatgttccgtggacgttcgtggagggcaccagctggaaatcaaatggcgggtgctcggcggttgggtgact
ggagaggtggggagctctcagattactctgaagagctgtgcccctggagagctccagccctccagaccctcagctgtgactgttc
20 tttctctgggttttactgaccattatggtataggagtaggtggattcgtcagccctccagggaaggctggagtggtgcacacac
atttgggtgaatgataataagactataacacagccctgaggagccgctcacaatctccaaggattctccacaacacaaagactc
ctcaagatcggcaatgtggagactgcagataccgccacatactactgtctctacggctacacttactggggccaaaggactctggtc
actgtctctgctgataca

- Amino acid sequence:
25 MKLPVRLVLMFWAPISISDVVMTQTPLSLPVSLGDQASISCRSSQSLLYSNGNTYL
HWYLLQKPGQSPKLLIYKLSNRFSGVSPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHVPWTFGGGTGLEIKDGGGSGGGSGGGSSQITLKESGPGSSQPSQTLSTLTC
SFSGFSLLTTYGIGVGWIRQPPGKGLEWLTHIWWDNKYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGTTLVTVSAD

30 **67. UCHL-1 scFv (SSS-S)H WCH2 WCH3**
Nucleotide sequence:

gtgtttaagctgccgccatgaagtgtgctgttaggctgttggctgatgtcttgattcctgcttccatcagtgatgttgatgacc
aaactccactctccctgccctgtcagcttggagatcaggccctcctcctcttgagatctagtcagagcccttttactagtaatggaac
35 acctattttacattggtacctgcagagccaggccagctctccaaactcctgatctacaactttccaacgattttctgggtcccaaga
cagggttcagtgccagtggatcaggagcagattcactcaaatcagcagagtgaggagctgaggatctggagattttctgtct
tcaaatgtacacatgttccgtggacgttcgtggagggcaccagctggaaatcaaatgatggctggctcggcggtggtgact
ggagaggtggggagctctcagattactctgaagagctgtgcccctgggatctgcagccctccagaccctcagctgtactgtttct
40 tctctgggtttcactgaccattatggtataggagtggttgattcgtcagccctccagggaaggctcggagtggtgcacacacat
ttgtgggaatgataataagactataacacagccctgaggagccggtcacaatctccaagattcctccacaacaaagatactct
caagatcgcgaatgtggacactgcagataccgccacatactactgtctctacggctacacttactggggccaaaggagactctgtca
ctgtctctcgtgatcaggagcccaaatcttctgacaaaactcacacatcccaccgtctcagaccctgaactcctgggtggaccgt
cagctctctctctcccccaaaaacccaggacaccctcatgatctccggacccttgaggctacatgctgggtgggagctgagc
45 caccgaagaccctgaggctcaagttcaactgtgactgtggacggcgtggaggtgcataatgccaaagacaaaggccggaggagca
gtacaacagcagctaccgtgtgtgtcagcgtcctaccgtcctgaccaggagctggctgaatggcaggaagtacaagtgcaaggtc
tccacaacaaagccctccagcccccacatcgagaaaacatctccaagaccaaaggcagcccccagagacacaggtgtacacact
ggccccctccgggatgagctgaccacaagaaaccaggtcagcctgacctgctgtgtcaaaaggctctatctcaagcgacatcggcgtg
50 gagtggagagcgaatggcgagccggagaaacactacaagaccacgcctcccggtgctgagctcggacggctctctctctctac
agcaagctcaccgtggagacaagcaggtggcagcaggggaagcgtcttctatgctccgtgatgatgaggtctgcacacaccat
acacgcagagagagcctctccctgtctccgggttaaatgatcaga

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Amino acid sequence:

MKLPVRLVLMFWIPASISDVVMTQTPLSLPVS LGDQASISCRSSQSLLYSNGNTYL
HWY LQKPGQSPKLLIYKLSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHPVPTFGGGTKLEIKDGGSGGGSGGGSSQITLKESGPGILQPSQITSLTCS
5 FSGFSLTTYGIGVGWIRQPPGKGLEW LTHIWWNDNKYYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGLTVTVSADQEPKSSDKTHTSPSSAP
ELLGGPSVFLFPKPKD TLMISRTP EVT CVVVDVSHEDPEVKFNWYVDGVEVHNA
KTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQ
10 PREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPV L
DSDGSFFLYSKLTVDKSRWQQGNV FSCSVMH EALHNHYTQKLSLSLSPGK

68. UCHL-1 scFv VHL11S (SSS-S)H WCH2 WCH3

Nucleotide sequence:

gtgttaagctgccgccatgaagttgacctgttagctgtgttgctgctgattgttggattcctgcttcacatcagtgatgttgatgaccc
aaactccactctcctcctcgtcgtcgtcgtgagntcaggcctccatctcttcagatctcagagcctctttacagtaaggaac
acctattacattggtacactgcagaaagccaggccagctctcctcaaaactcctgatctacaaacttccaacccgattttctgggtccccaga
caggttcagtgccagtgatgacaggacagattcacactcaagatcagcagagtgaggagtgatctggagttattttgtctc
20 tcaaaatcacatgcttcctggtgacgttcgggtggagccaccagctggaatcaaaagatggcggctgcggcggttggtggtatct
ggaggaggtggagctctcagattactctgaagagctctgcccctggagctccagcccctccagaccctcagctctgactgtgtc
tttctctgggtttcactgaccacttatgtagagtagtggtgattcgtcagcctccagcagggaaggtctggaatgctgtgacacac
atttggtggaatgataaagtactataacacagccctgaggagcggcctcaaatctcaagatcttcacaaaccaagtaactc
ctcaagatcgccaatgtggacactgcagataccgccacatactactgtctctacggctacac(tactggcgcccaaggagctgtgtc
25 ctctctctgtgacaggagcccaaatctctgacaaactcacatccccaccgtccctcagcactggaactctgggtggagcg
tcagttctctctctccccaaaacccaaggacacctatgatctccggaccctctaggctacatcgctgtgtgagcagtgag
ccacgaagacctgaggtcgaagtcaactggtacgtgagcgcgtgaggtgcataatgccaaagcccgaggagagc
agtacaacagcagctaccgtgtgtgacgctcctcaccgtctgcaccagactggtgtaatggcgaaggagtaacagtgcaaggt
ctcaacaagaagcctccagcccccagagaaacatctccaaagccaanaggcgagcccccagaccacaggtgtacaccc
30 tggccccatccgggtagctgaccaagaaccaggtcagcctgacctgctgtcctcaaaagctctatccaaagcagatccgctg
ggagtgaggagcaatggggagccggagaanaactacaagaccagcctccgctgctgactccgagcctcctctctctccta
cagcaagctcaccgtggacaagagcaggtggcagcagggaacgtctctctatctctcgtatgatagaggtctgcacaacca
ctacacgagaaagagcctcctctgtctccgggtaagtatttagaa

Amino acid sequence:

MKLPVRLVLMFWIPASISDVVMTQTPLSLPVS LGDQASISCRSSQSLLYSNGNTYL
HWY LQKPGQSPKLLIYKLSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDLGVYFCS
QSTHPVPTFGGGTKLEIKDGGSGGGSGGGSSQITLKESGPGSSQPSQITSLTCS
35 SFGFSLTTYGIGVGWIRQPPGKGLEW LTHIWWNDNKYYNTALRSRLTISKDSSNN
QVLLKIANVDTADTATYYCLYGYTYWGQGLTVTVSADQEPKSSDKTHTSPSSAP
ELLGGPSVFLFPKPKD TLMISRTP EVT CVVVDVSHEDPEVKFNWYVDGVEVHNA
KTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQ
40 PREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPPV L
DSDGSFFLYSKLTVDKSRWQQGNV FSCSVMH EALHNHYTQKLSLSLSPGK

69. 5B9 VH L11S

Nucleotide sequence:

gggagctctcagctgcagctgaagcagctcaggacctggctcagtcagctcctcacagagcctgtccatcaccctgcacagctctctg
gtttctattaactaacctatgctgtacactgggttcgccagctccaggaaaggctctggagtggtctggagtgatagtgagtggtgg
50 aatccagactataatgagctttcatatccagactgagcaltaccagaggacgattccaagagcgaagtgtttttaaataagaacgtc

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PCT/US2003/041600

tgcaacctaatgacacgcccatttattactgtgccagaatatgggggtgataactacccttattactatgctatggactactgggggtcaa
ggaaacctcagtcacccgtctctcag

Amino acid sequence:

(GSS)QVQLKQSGPVSQSSQSLSIITCTVSGFSLTTYAVHWVRQSPGKGLEWLGVI
WSGGITDYNAAFISRLSITKDDSKSQVFFKMNSLQPNDAIYYCARNGGDNYPPY
YAMDYWGQGSTVTVSS

73. 5B9 VH L11S scFv

Nucleotide sequence:

aagcttgccgccatgagggttctctgctcagcttctggggctgcttgtgctctggatccctggatccactgcagatattgtgatgacgca
ggctgcattctccaatccaagtcaccttggaaacatcagcttccatctctcaggtctgataagagcttctccatagtaagtgcacga
cttaillgtatlggtatctgcagaagccaggccagctctctcagctcctgattatcagatgtccaaaccttgcctcaggagtcacagaca
15 cagtcagtagcgtgggtgcaggaaactgatttcacactgagaatcagcagagtgaggagctgaggatgfggggtgatttactgtgtc
aaatctcagaacttcgcctcagcttctggtgctgggaccangctggagctgaaacgggggtggcggtgctcggcggtgggtgggt
cgggtggcgccgggagctcaggtgcagctgaagcagtcagacctggctcagtgctcagctccacagagcctgtccatcacct
gcacagtctctgtttctcattaaactaactatgctgtacactgggttcgccagctccagcaaaagggtgctgagtggtcggagtgat
atggagtggtggaactcagactataatgcagctttcatalccagactgagcatcaccaggacgttccagagccaaagttttctt
20 aaatgaacagctctgcaacctaatgacacgcccatttattactgtgccagaatatgggggtgataactacccttattactatgctatgga
ctactgggtcaaggaaacctcagtcacccgtctctcag

Amino acid sequence:

AMSAQQLGLLVLPWGSTADIVMTQAAFSNPVTLGTSASISCRSSKSLLSHNGITY
17LYWYLOKPGQSPQLLIYQMSNLASGVPDRFSSSGSGTDFTLIRSRVIEADVGVYYC
25 AQNLELPLTFGAGTKLELKRGGGSGGGGSGGGSSQVQLKQSGPVSQSSQSLSI
TCTVSGFSLTTYAVHWVRQSPGKGLEWLGVIWSGGITDYNAAFISRLSITKDDSKS
QVFFKMNSLQPNDAIYYCARNGGDNYPPYAMDYWGQGSTVTVSS

70. 5B9 scFv VH L11S (SSS)-II WCH2 WCH3

Nucleotide sequence:

aagcttgcgccatgaggttctctgctcagcttctggggctgcttgtgctctggatccctggatccactgcagatattgtgatgacga
ggctgcattctccaatcagtcaccttggaaacatcagcttccatctcctcaggtctgataagagcttctccatagtaagtgcacga
35 ctattttgattgtgctatctgcagaagccaggccagcttctcagctcctgattatcagatgtccaaaccttgcctcaggagtcacagaca
ggttcagtagcagtggtgcaggaaactgatttcacactgagaatcagcagagtgagggtgaggatgfggggtgatttactgtgtc
aaatctcagaacttcgcctcagcttctggtgctgggaccangctggagctgaaacgggggtggcggtgctcggcggtgggtgggt
cgggtggcgccgggagctcaggtgcagctgaagcagtcagggactgggtcagtgtagtctccacagagcctgtccatcacct
gcacagtctctgtttctcattaaactaactatgctgtacactgggttcgcagctccagcaaaagggtcggagtggtcggngtgat
40 atggagtggtggnaacacagactaataatgcagctttcatalccagactgagcatcaccaaaggacgattccaaagccaaagtttctt
aaatgaacagctctgcaacctaatgacacagcccatttattactgtgccagaatatgggggtgataactaccccttattactatgctatgga
ctactgggtcaaggaaacctcagctcctctgacaggaccacaatacttctgcagaaactccacacatccaccacgtctc
agccactgactcctgggtggaccgtcagcttctctctcccccaaaaacccaaggacacctcatgctccggaccctcagg
tcacatgcgtgtgtgtgtgacgtgagccacgaagacctgaggtcnaagttcaactgtgtacgtgacggcggtggagtgataatgc
45 caagacaanaagccgcgggaggaagcagtaacaacagcagctaccgtgtgtgtcagcgtctcaccgtctcgcaccaggaactgtgtga
atggcaaggaggtacaaagtccaaggtctccaaanaagccctccagcccccagagaaacacatccaaaggcnaaggcag
ccccgagaaacacnagggttacacctccccatccccggatgagctgacaaagacaaggctcagctgactgctgtcctcaga
agcttctcacaagcagactcgcctggtgagtggtggagagcaatggcgagccggagagaacaactacaaagacacgcctcccggtgt
ggtcctccagcggctcttctctcagacnaagctcaccgtggacaagagcagtggtgcagcaggggaacgttctctcatgctcc
50 gtgatgcatgaggtctgcacaacactacacagagaagacctctcctgtctccgggtgataatgatcatgag

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Amino acid sequence:

MRFSAQQLGLLVLPWPGSTADIVMTQAAFSNPVTLGTSTASISCRSSKSLLSHNSGITY
LYWYLQKPGQSPQLLIYQMSNLASGVPDRFSSSGSGTDFTLRISRVEAEDVGVYYC
AQNLELPLTFGAGTKLELKRGGGSGGGSGGGSSQVLKQSGPGSVQSSQSLSI
5 TCIVSGFSLTTYAVHWVRVQSPGKLEWLVGIWSGGITDYNAAFISRLSITKDDSKS
QVFFKMNSLQPNDAIYYCARNGGDNYPPYYAMDYWGQGTSTVTVSSDQEPKSS
DKHTSPSSAPELLGSPSVFLFPKPKDITLMISRTPEVTCVVVDVSHEDPEVKFNW
YVDGVVHNAAKTPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAP
PIEKTISKAKGQPREPQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQP
10 ENNYKTTTPVLDSGSEFLYSLKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLS
LSPGK

15 **76. 2H7 scFv VH L11S (SSS-S)H P238SCH2 WCH3**

Nucleotide sequence:

aagcttgccgccatgcatgtttcagtcagatttcagcttctgctaatacagtgcttcagcataattgccagaggacaaattgtctct
cccagctccagcaaatctgtctgcatctccaggaggagagtcacaaatgactgcaggccagctcaagtgttaattacatgcact
ggtagcaccagagaagccagatctccccaaacctgatttgcctccacacctgcttcaggatccctgctcgttcagtg
20 gcagtggtctgagaccttactctctcaaatcagcagagtgaggctgaagatgctgccaattacttactgccagcagtgaggtt
taaccaccacagcttgcgtgctggaccagctggagctgaagatggcgggtgctcggcggtgtgtgagctgagagaggtg
ggagctctcaggttatctacagcagctgggctgagctgctggcctcagtggaagtgtcctgcagagctcctgctg
tacacattaccagttacaatatgacactgggttaagcagacacagcagagggcctggaattgattgagctattatccaggaat
ggtgtatctctcaaatcagaagttcaaggcgaagccacactgactgtgacaaatctccagcagacgctacatgcagctcag
25 cagcctgcacatctgaagactctgggtctatttctgtgcaagagtgtgtactatagtaactcttactgtacttcgaigtctgtggcac
aggagaccaggtcaccgtctctctctgacaggagcccaaatctctgacaaaactcaacatccccaccgtctcagacactgaact
ctctgggggagtcgtcagcttctcttcccccacaaagcagacacctcatgctctccggaccctgaggttcacatgggtgg
tggtggacgtgagccacgaagacctgaggtcaagttcaactgtgacgtgagcgtgaggtgaggtgcataatgccagacaagc
30 cggcggagagcagctacacagcagctaccgtgtgtgacgcgtctcaccgtctgcaccagcagctggtgaatggcgaagag
tacaagtgcaagcttccacaagaacctccagcccccacgagaaacatctccaaagcacaagggcagccccgagaacc
acaggtgtacacacctgcccccatccgggatgagctgaccaagaaccaggctcagcctgacctgctgtcacaaggcttctatccc
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gtctcttctctctacagaaagctcaccgtggacagagcaggtggcagcagggagacactgtctctcatgctccgtgatgatg
35 gctctgcacaaactacacgacgaagaagcctctctctgctccgggttaaatgatcagta

Amino acid sequence:

MDFQVQIFSFLLISASVILARGQIVLSQSPAILASPGKEKVTMTCRASSVSVMHWY
QQKPGSSPKPWYAPSNLASGVPARFSGSGGTSYSLTISRVEAEDAATYYCQQWS
FNPPTFGAGTKLELKDGGGSGGGSGGGSSQAYLQSGAESVRPGASVKMSCK
40 ASGYTFTSYNMHWVKQTPRQGLEWIGAIYPGNGDTSYNQKFKGKATLTVDKSSS
TAYMQLSSLTSEDSAVYFCARVYYSSNYWYFDVWGTGTVTVTVSSDQEPKSSDK
DHTSPSSAPELLGSSSVFLFPKPKDITLMISRTPEVTCVVVDVSHEDPEVKFNWVY
DGVVHNAAKTPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYITLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPN
45 NYKTTTPVLDSGSEFLYSLKLTVDKSRWQQGNVFCSCVMHEALHNHYTQKSLS
LSPGK

78. 2H7 scFv VH L11S (SSS-S)H WCH2 WCH3

Nucleotide sequence:

50 aagcttgccgccatgcatgtttcagtcagatttcagcttctgctaatacagtgcttcagtcataattgccagagacaaattgtctct
cccagctccagcaaatctgtctgcatctccaggaggagagtcacaaatgactgcaggccagctcaggtgttaattacatgcact

PCT/US2003/041600

Amino acid sequence:

79. 2H7_{scFv} VH L11S (CSS-S)H WCH2 WCH3

Nucleotide sequence:

399